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Entomological & Natural History Society

(Established 1872)

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1895 Ashby, S. R., F.E.S., 119, Greenvale Road, Eltham Park, Kent. *c*, *l*.
1895 Ashdown, W. J., Belmont Road, Leatherhead. *l*, *c*, *he*.
1888 Atmore, E. A., F.E.S., 48, High Street, King's Lynn, Norfolk. *l*.

1887 Barren, H. E., 78, Lyndhurst Road, Peckham, S.E. *l*.
1900 Barrett, J. P., F.E.S., Westcroft, South Road, Forest Hill, S.E. *l*.
1912 Bateson, Dr. W., F.R.S., F.L.S., F.E.S., The Manor House, Merton, Surrey. (*Hon. Member.*)
1909 Baumann, R. T., 108, Station Road, Chingford. *l*.
1897 Bishop, E. B., Lindfield, Marshall Road, Godalming. *l*, *b*.
1911 Blair, K. G., B.Sc., F.E.S., 23, West Hill, Highgate, N. *n*, *c*.
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1895 Bowman, K., The May Sharp Construction Co. Ltd., Edmonton, Alta, Canada. *l*.

YEAR OF
ELECTION.

1887 BRIGGS, C. A., F.E.S., Rock House, Lynmouth, R.S.O., N. Devon. *l, m, n, o, British fishes.*

1891 BRIGGS, H. M., 8, High Street, Canterbury. *l, orn.*

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1895 BROOKS, W., Grange Hall, near Rotherham. *l.*

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1897 BURR, M. B., D.Sc., B.A., F.L.S., F.E.S., F.Z.S., Castle Hill House, Dover. *o.*

1890 BUTLER, W. E., F.E.S., Hayling House, Oxford Road, Reading. *l, c.*

1911 BUXTON, PATRICK A., F.E.S., Fairhill, Tonbridge, Kent. *l.*

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1907 COOTE, F. D., 25, Pendle Road, Streatham, S.W. *l, b.*

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YEAR OF ELECTION.

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1900 Day, F. H., F.E.S., 26, Currock Terrace, Carlisle. *l, c.*

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1889 Dennis, A. W., 56, Romney Buildings, Millbank, S.W. *l, mi, b.*

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1886 Enock, F., F.L.S., F.E.S., F.R.M.S., F.R.H.S., 13, Tufnell Park Road, Holloway, N. *d, mi.*

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1889 Ford, A., South View, Irving Road, West Southbourne, Bournemouth, Hants. *l, c.*

1907 Fountaine, Miss M. E., F.E.S., 1, The Studios, Sherriff Road, West Hampstead, N.W. *l.*

1912 Freeman, C. N., The Hollies, Hatherley Road, Sidcup, Kent.

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1912 Frohawk, F. W., M.B.O.U., F.E.S., Stanley House, Park Road, Wallington, Surrey. *l, orn.*

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1909 HEMMING, Mrs. C. U. H., Cambridge Lodge, Horley, Surrey. *l.*

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1886 JÄGER, J., 65, St. Quentin's Avenue, North Kensington, W. *l.*

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1886 KANE, W. F. DE V., M.A., F.E.S., M.R.I.A., Dadmans, Sittingbourne, Kent. *l, mi, marine invertebrata.*

1898 KAYE, W. J., F.E.S., Caracas, Ditton Hill, Surbiton, Surrey. *l, S. American l.*

1900 KEMP, S. W., B.A., F.E.S., Indian Museum, Calcutta. *l, c.*

1910 KIDNER, A. R., Swinney Garth, Hatherley Crescent, Sidcup, Kent. *l.*

1910 LAWRENCE, A. J., 2, Arthur Street, New Oxford Street, London, W. *l.*

1914 LEEDS, H. A., Grantham Cottage, Milestone Road, Knebworth, Herts. *l.*

1911 LESLIE, J. H., F.E.S., 84, Huron Road, Tooting Common, S.W. *l.*

1903 LISTER, W. K., F.E.S., Street End, Ash, near Canterbury. *l.*

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1896 LUCAS, W. J., B.A., F.E.S., 28, Knight's Park, Kingston-on-Thames. *Brit. o., odonata, n, m, b.*

1910 LYLE, G. T., Bank House, Brockenhurst, Hants. *h, l.*

1892 MAIN, H., B.Sc., F.E.S., Almondale, Buckingham Road, S. Woodford, Essex. *l.*

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1889 MANSBRIDGE, W., F.E.S., 4, Norwich Road, Wavertree, Liverpool. *l.*

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1885 MERA, A. W., 79, Capel Road, Forest Gate, E. *l.*

1881 MILES, W. H., F.E.S., 7, Church Lane, Calcutta. Post Box 126. *mi, b.*

1880 MONTIERO, A. A. DE C., F.E.S., 70, Rua do Alecrim, Lisbon.

1889 MOORE, H., F.E.S., 12, Lower Road, Rotherhithe, S.E. *l, h, d, e l, e h, e d, mi.*

1910 MORFORD, D. R., 16, Spencer Road, Cottenham Park, Wimbledon, Surrey. *l.*

1911 MORICE, The Rev. F. D., M.A., F.E.S., Brunswick, Mt. Hermon, Woking. (*Life Member.*) *h.*

1912 MORRIS, A. C., Leafield, Gibson's Hill, Upper Norwood. (*Life Member.*) *l.*

1912 NEAVE, B. W., Lyndhurst, 95, Queen's Road, Brownswood Park, N. *l.*

1906 NEWMAN, L. W., F.E.S., Salisbury Road, Bexley, Kent. *l.*

1911 PAGE, H. E., F.E.S., Bertrose, Gellatly Road, New Cross, S.E. *l.*

1905 PENN-GASKELL, W. W., Townshend House, North Side, Regent's Park, N.W. *l.*

1908 PENNINGTON, F., Reform Club, Pall Mall, S.W. *l.*

1880 PERKINS, V. R., F.E.S., Wotton-under-Edge, Gloucestershire. *l, h, d.*

1911 PESKETT, G. E. H., Llanberis, 37, Woodbury Grove, Finsbury Park, N. *l.*

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Election.
1887 Porritt, G. T., F.L.S., F.E.S., Elm Lea, Dalton, Huddersfield. *l, n.*
1912 Poulton, Prof. E. B., D.Sc., M.A., F.R.S., F.L.S., F.E.S., Wykeham House, Oxford. (*Hon. Member.*)
1903 Pratt, W. B., F.E.S., 10, Lion Gate Gardens, Richmond, Surrey. *l.*
1897 Prest, E. E. B., Arva, Ashtead, Surrey. *l.*
1903 Priske, R. A. R., F.E.S., 9, Melbourne Avenue, W. Ealing, W. *l, m.*

1911 Quarrington, A., 14, The Broadway, West Norwood, S.E. *l.*

1902 Rayward, A. L., F.E.S., Rockford, Beechwood Road, Sanderstead, Surrey. *l.*
1887 Rice, D. J., 8, Grove Mansions, North Side, Clapham Common, S.W. *orn.*
1902 Riley, N. D., 94, Drakefield Road, Upper Tooting, S.W. *l.*
1910 Robertson, G. S., M.D., St. Anne's, 101, Thurlow Park Road, Dulwich, S.E. *l.*
1887 Robinson, A., B.A., 5, King's Bench Walk, Temple, E.C. *l.*
1894 Robinson, Leigh, F.Z.S., 4, Queen's Walk, Ealing, W. *l.*
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1887 Routledge, G. B., F.E.S., Tarn Lodge, Heads Nook, Carlisle. *l; c.*
1900 Rowden, A. O., 3, Archibald Road, Exeter. *l, b.*
1904 Rowland-Brown, H., F.E.S., Oxhey Grove, Harrow Weald. *l.*
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1902 Scollick, A. J., F.E.S., Elmswood, Malden Road, New Malden, S.W. *l.*
1910 Scorer, A. G., F.E.S., Hillcrest, Chilworth, Guildford. *l.*
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1898 Sich, Alf., F.E.S., Corney House, Chiswick, W. *l.*
1903 Smallman, R. S., F.E.S., Eliot Lodge, Albemarle Road, Beckenham, Kent. *l.*

Year of
Election.

1908 Smith, B. H., B.A., F.E.S., *President*, Edgehill, Warlingham, Surrey. *l.*

1890 Smith, Walter, 227, High St., Hampton Hill, Middlesex. *l.*

1890 Smith, William, 13, St. Mirren Street, Paisley. *l.*

1882 South, R., F.E.S., 4, Mapesbury Court, Shoot-up-Hill, Brondesbury, N.W. *l.*

1908 Sperring, C. W., 8, Eastcombe Avenue, Charlton. *l.*

1912 Stallman, F. H., Braemar, Thurlow Park Road, Dulwich, S.E.

1873 Standen, R., F.L.S., F.E.S., Newlyn, Romsey, Hants. (*Life member.*) *l.*

1872 Step, E., F.L.S., *Hon. Editor*, Oakwood House, Barnett Wood Lane, Ashtead, Surrey. *b, m, cr.; Insects, all Orders.*

1909 Stone, F. J., 141, Bedford Road, Clapham, S.W. *l.*

1910 Stoneham, Lieut. H. F., F.E.S., Wellington Barracks, Dublin. *orn, b.*

1913 Storey, Gilbert, Imperial Bureau of Ent., British Museum (Nat. Hist.), South Kensington, S.W. *Econ. Ent.*

1911 Stowell, E. A. C., B.A. (Oxon.), Laleham, Bexhill.

1911 Sweeting, H. R., M.A., Wilfruna, Alexandra Grove, N. Finchley.

1894 Tarbat, Rev. J. E., M.A., Fareham, Hants. *l, ool.*

1913 Tatchel, L., 23, The Arcade, Bournemouth. *l.*

1910 Tautz, P. H., Cranleigh, Nower Hill, Pinner. *l.*

1911 Todd, R. G., The Limes, Hadley Green, Barnet. *l.*

1902 Tonge, A. E., F.E.S., *Vice-President*, Aincroft, Grammar School Hill, Reigate. *l.*

1895 Tunaley, Hy., F.E.S., 13, Becmead Avenue, Streatham, S.W. *l, h.*

1887 Turner, H. J., F.E.S., *Hon. Report Secretary*, 98, Drakefell Road, New Cross, S.E. *l, c, n, he, b.*

1889 Vine, A. C., 45, Temple Street, Brighton, Sussex. *l.*

1889 Wainwright, C. J., F.E.S., 45, Handsworth Wood Road, Handsworth, Staffs. *l. d.*

1911 Wakely, L. D., 34, Lancaster Road, Wimbledon Common, S.W. *l.*

1880 Walker, Comm. J. J., M.A., F.L.S., F.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c.*

1886 Walsingham, The Right Hon. Lord, M.A., LL.D., F.R.S., F.L.S., F.Z.S., F.E.S., &c. (*Hon. member.*) *l, orn.*

YEAR OF
ELECTION.

1888 Webb, S., 9, Waterloo Crescent, Dover. *l.*

1911 Wells, H. O., 42, The Avenue, Norwood, London, S.E.

1872 West, W., *Hon. Curator*, 8, Morden Hill, Lewisham Road, S.E. *l, c, he.*

1878 West, W., L.D.S., Holmwood, Barnett Wood Lane, Ashtead, Surrey. *l, mi.*

1911 Wheeler, The Rev. G., M.A., F.Z.S., F.E.S., 37, Gloucester Place, W. *l.*

1887 Whiffen, W. H., Brockenhurst, Hants. *l.*

1914 Williams, B., 77, Durham Road, E. Finchley, N.W. *l.*

1912 Williams, C. B., B.A., The Horticultural Institute, Merton, Surrey. *l.*

1905 Winkworth, J. T., 290, Burdett Road, E. *l.*

1913 Wixcey, C. R., 63, Grovelands Road, Palmers Green, N. *l.*

1914 Worsley-Wood, H., 31, Agate Road, Hammersmith, W. *l.*

Members will greatly oblige by informing the Hon. Sec. of any errors, additions or alterations in the above Addresses and descriptions.

REPORT OF THE COUNCIL, 1913.

THE Council of the South London Entomological and Natural History Society, in presenting the forty-second Annual Report, is pleased to state that the Society continues in a satisfactory condition. During the year just passed 12 new ordinary members have been elected; but, on the other side of the account, six have resigned, and 8 have been taken from the roll for non-payment of subscriptions. No deaths amongst the ordinary members have occurred; but one of our original honorary members has passed away, *viz.*, Lord Avebury, F.R.S., etc., who joined the Society in 1872.

The Membership, therefore, stands as follows, 3 Honorary, 8 Life, 26 Country, and 142 Ordinary Members, making a total of 179.

The Balance Sheet, duly audited, is printed on pages xvi., xvii.

The Meetings have been well attended, and the Recorder, Mr. A. W. Dennis, reports that there has been an average attendance of over 39 at each of the 23 meetings. At the meeting on April 24th, there was a special Exhibition of Orders other than Lepidoptera; this, a new experiment, was, both from the number present, and the very interesting objects exhibited, a great success, and will be repeated again next year.

At the Annual Special Exhibition of Varieties held in November, 99 members and friends attended; and although the numbers were not so numerous as on the two previous occasions, yet the exhibits, which were as usual, chiefly Lepidoptera, showed a high standard of excellence from a varietal point of view.

The Society is indebted to Mr. F. Noad Clark for again taking charge of the lantern on each of the six occasions when it was used.

The following is a list of the "Papers" read before the Society.

March 18th.—"*Tinea pallescentella*—Some Notes on its History and its Life-history," by R. Adkin.

April 10th.—"In the Balkans with a Camera," by Mr. A. E. Gibbs, with lantern slides.

May 8th.—"Spring in the South Tyrol," by Messrs. E. and A. Sich.

May 22nd.—"One of our Common Butterflies, *Epinephele jurtina*," by Mr. H. J. Turner.

October 9th.—" On the British Short-horned Grasshoppers," by Mr. W. J. Lucas, with lantern slides.

October 23rd.—" On Mimicry in the North American Nymphalinæ," by Prof. E. B. Poulton, F.R.S., with lantern slides.

November 13th.—" On Species which overlap Geographically," by Prof. W. Bateson, F.R.S., with lantern slides and other exhibits.

December 11th.—" The Ithomiinæ," by Mr. W. J. Kaye.

January 8th.—" The Brunig Road, Switzerland," by Mr. H. Main, with lantern slides.

The Honorary Curator, Mr. W. West (Greenwich), reports that the following donations have been made to the Society's collections during the past year :—

British Tortrices, from Mr. R. Adkin.

A pair of *Phryxus livornica*, from Mr. B. H. Smith.

A short series of *Erebia zapateri*, from Mr. H. E. Page.

Orthosia ocellaris, from Mr. H. Worsley Wood.

Black varieties of *Acidalia virgularia*, from Mr. R. T. Baumann.

Coleoptera from Messrs. Ashby, Ashdown and W. West.

A box of Diptera, from Mr. S. Edwards.

The Council is pleased to be able to say that, with the kind help of several friends, they have at last been able to obtain a suitable additional bookcase. This will relieve the somewhat congested state of the Library, and enable the Librarian to put the books in a more systematic order than has hitherto been possible, as well as affording room for additions.

A very handsome donation to the Society's reference collections has been made by one of our oldest members, Mr. W. G. Dawson, of Abbot's Morton, nr. Worcester, consisting of a fine collection of British Macro- and Micro-Lepidoptera, which has already for the most part been amalgamated with the series in the cabinets. As a result there are now very few species unrepresented by a series of forms illustrating their extent of variation. The Society wish to record here their great appreciation of Mr. Dawson's fine gift.

The Honorary Librarian reports that considerable use still continues to be made of the Library on meeting nights.

There have been six Field Meetings held during the year :—

May 31st.—Netley Heath, conducted by Mr. W. J. Kaye.

June 21st.—Mickleham, conducted by Messrs. Carpenter and Step.

July 5th.—Westerham, conducted by Mr. R. Adkin.

July 19th.—Visit to the Innes Horticultural Institution, Merton, over which members were kindly conducted by the Director, Prof. W. BATESON, F.R.S.

September 13th.—WORMS HEATH, conducted by Mr. B. H. SMITH.

October 4th.—OXSHOTT (Fungus Foray), conducted by Mr. E. STEP.

Messrs. E. Step and Hy. J. Turner were again the delegates to the Annual Congress of the South-Eastern Union of Scientific Societies, which was this year held at Hampstead in June.

Mr. R. Adkin again attended the meeting of representatives of Corresponding Societies to the British Association, this year held at Birmingham.

Mr. K. G. Blair, B.Sc., was the Society's Delegate at the Zoological Congress, held at Monaco from March 25th to the 30th.

As a result of the Special Meeting called to consider the questions of the appointment of an Editor, and an increase in the number of Members of Council, it was decided to create the above office and to add two additional members to the Council.

In accordance with Bye Law 5, Section 2, as amended your Council appointed Mr. E. Step to fill the newly created office of Hon. Editor, and Messrs. J. Platt Barrett and N. D. Riley to be the two additional members of the Council.

The volume of Proceedings published during the past year consists of xviii. and 154 pages with ten plates, a considerable increase both in plates and in letterpress. There was some delay in the issue of the volume due to unavoidable circumstances, which are not expected to recur.

The following is a list of additions to the Library :—

Books.

"Messmates," by E. Step, from the author.

"Text-book of Butterflies and Moths," by Messrs. Newman and Leeds, from the authors.

"Entomologist's Record," Vol. X., from H. E. Page.

"Toadstools and Mushrooms of the Countryside," by E. Step, from the author.

"Writings of Dr. T. A. Chapman," Vol. ii. and Vol iii., from the author.

"Revision of the Ichneumonidæ," from the Trustees of the British Museum.

"The House-fly as a Danger to Health," from the Trustees of the British Museum.

"House-flies and how they spread disease," by C. G. Hewitt, from Mr. H. W. Andrews.

Magazines and Periodicals.

"Entomologist," from the Editor.
"Irish Naturalist."
"Bulletin of the Entomological Society of France."
"Deutsches Entomologische Mitteilungen."
"Entomological News."
"Canadian Entomologist."
"Entomologists' Monthly Magazine."

Reports and Transactions of Societies.

"Transactions of the Perthshire N.H. Society."
"Annual Volume of the Smithsonian Institute."
"Manchester Entomological Society."
"Zoological Society."
"Carlisle Society," Vol vi.
"Columbian Entomological Society."
"Horniman Museum, 1912."
"British Association for 1912."
"Torquay Natural History Society."
"Field Museum of Natural History, Chicago."
"The Ontario Entomological Society."
"Academy of Sciences, Texas, 1910-12."
"Norfolk and Norwich Natural Science Society.
"Smithsonian Report, 1912."
"Report of the Smithsonian Museum, 1912."
"Essex Naturalist."
"Report of the Hastings Natural History Society."

"The South-Eastern Naturalist," being the Proceedings of the South-Eastern Union of Scientific Societies, 1913.

Pamphlets, Separata, etc.

"Preliminary List of Insects of Quebec."

"Catalogue of the Horniman Library."

"Uppsala publications. *Argyresthia conjugella* in Sweden."

"Parasites of *Simulium* larvæ," } by Prof. Strickland from
"Quiescent stage in *Termes flavipes*," } Mr. E. B. Smith.

"Butterfly hunting in the Balkans," by A. E. Gibbs, from the author.

"New Peruvian Mammals," from the Chicago Society.

"Monograph of the Territorial Palæozoic *Arachnidæ* of N. America," from Yale University Society.

"Papers read at the Chicago Natural History Society," (3).

"List of Lepidoptera around Haslemere," by F. A. Oldaker, from the author.

"Morphology of Insects," by C. Janet, from the author.

"Contributions to the U.S. National Herbarium."

"*Onagraceæ* (Smithsonian Institute)."

"*Cœnonympha tiphon*," by H. Rowland-Brown, from the author.

"The Pilgrims' Pageant, Reigate," from R. Adkin.

"Respiration in Insects," by Brook.

"Experiments in the flight of Insects," from the British Museum.

"Lepidoptera at Albarracin in May and June, 1913," by W. G. Sheldon, from the author.

"Address to the Delegates to the British Association, 1913," by Dr. P. Chalmers Mitchell, from R. Adkin.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

STATEMENT OF ACCOUNTS FOR THE YEAR 1913.

REVENUE ACCOUNT.

Expenditure.				£	s.	d.	*Income.*	£	s.	d.
To One Year's rent				25	0	0	By Balance from 1912	3	4	9
,, Insurance				0	14	0	,, Subscriptions, 91 at 10/–	45	10	0
,, Attendances on year				2	10	0	,, ,, 27 ,, 7/6	10	2	6
,, Subscription to South-Eastern Union				0	10	0	,, ,, 1 ,, 6/–	0	6	0
,, Postages, Stationery and Sundries:—							,, ,, 7 ,, 5/-	1	15	0
S. Edwards	4	18	6				,, ,, 14 ,, 2/6	1	15	0
H. J. Turner		12	6				,, ,, paid in advance	4	15	0
T. W. Hall	1	15	6				,, Arrears of Subscriptions received	11	2	6
				7	6	6	,, Entrance fees, 13 at 2/6	1	12	6
Entrance fees carried to Suspense Account				1	12	6	,, One Life Membership additional Subscription	5	16	0
,, Life Membership Subscription, Suspense Account				6	6	0				
,, Vote to Publication Fund				40	0	0				
,, Vote to Library Fund				1	0	0				
,, Balance				1	0	3				
				£85	19	3		£85	19	3

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT.

(Held in Suspense.)

	£	s.	d.		£	s.	d.
To Balance	47	7	0	By Balance from 1912	39	8	6
				,, Entrance fees, 1913	1	12	6
				,, Life Membership Subscription	6	6	0
	£47	7	0		£47	7	0

LIBRARY FUND.

	£	s.	d.		£	s.	d.
To Binding (Andrews)	0	18	9	By Balance from 1912	0	17	0
,, Librarian's Postages	0	0	5	,, Fines (1913)	0	0	6
,, Balance	0	18	4	,, Vote from Revenue Account	1	0	0
	£1	17	6		£1	17	6

PUBLICATION FUND.

	£	s.	d.		£	s.	d.
To Debit Balance (1912)	19	9	11	By Donations	16	12	6
,, Archer's Account for 1912 "Transactions"	36	16	6	,, Sale of "Proceedings"	0	6	0
,, Gibbs and Bamforth for Illustrations	5	4	0	,, Vote from Revenue Account	40	0	0
				,, Debit Balance	4	11	11
	£61	10	5		£61	10	5

BALANCE SHEET.

Liabilities.	£	s.	d.	*Assets.*	£	s.	d.
To Debit Balance Publication Fund	4	11	11	By amount to Credit of Revenue Account	1	0	3
,, Balance being excess of Assets over Liabilities	50	19	8	,, ,, ,, ,, Suspense Account	47	7	0
				,, ,, ,, ,, Library Fund	0	18	4
				,, Subscriptions in Arrear, £11 2s. 6d., valued at	6	6	0
	£55	11	7		£55	11	7

Audited and found correct, *January* 10*th*, 1914.

A. RUSSELL,
FRED. NOAD CLARK, } *Auditors.*

Tinea pallescentella, Stainton (=nigrifoldella, Gregson). Some notes on its life-history and its history.

By Robert Adkin, F.E.S. *Read March 13th*, 1913.

Some twenty years ago, as I was passing along Cannon Street in the City of London one morning, I espied a tineid moth resting on the window frame of one of the houses, and, fortunately having a pill box in my pocket, promptly captured it; the moth on subsequent examination proved to be *Tinea pallescentella*, and this was my first acquaintance with the species. From that time until August 28th, 1902, I saw nothing more of the insects; then I took a single specimen in my house at Lewisham. Again there followed a gap of some years without it being noticed, but on June 26th, 1908, I met with it, this time flying in my study in the evening, and on November 6th, 1909, and August 17th, and December 25th, 1911, I again met with it under exactly similar circumstances. A specimen was also taken in my dining room during the Entomological Club supper on March 12th, 1912, while in the meantime I had also taken a specimen in the room of a house at Eastbourne where I was staying, on October 5th, 1910.[1]

Towards the end of November last my friend and fellow member, Mr. Noel S. Sennett, gave me a handful of "hare's hair," in which several Tineid larvæ were feeding. This I placed in a large glass jar, so that the larvæ might be under observation, and in the result I reared, between the 7th and 24th of January, eight specimens of *Tinea pallescentella*. Before going further I should explain that "hare's hair" is the fur cut from hare's skins. I am informed that, on the skins being received from poulterers and the like by the furriers they go through several processes, in the course of which they are brushed with a solution of mercury and nitric acid; the fur is then cut from the skins, packed into bags and stored away until such time as it may be sold, and is ultimately used in the manufacture of felt hats and for some other purposes. The particular consignment of which I received a portion came direct from Brandon in Suffolk, a country town at some distance from any sea-port and the hair appears to have been obtained from English hares, produced in the district. From its matted condition it was judged to have been in the bags for at least a couple of years; it was sent direct from Brandon to London, and the larvæ were detected in it on its being unpacked immediately on arrival. Larvæ were also found in bags of rabbit hair received at the same time from the same place.

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[1] Since writing the above another specimen was taken in my house at Lewisham; it was running about on the lavatory wall at 10 p.m., on April 2nd, 1913.

The hair, when I received it, appeared to contain a good many larvæ, and probably I should have reared a larger number of specimens had I not allowed it to become dry, for I can assign no other reason for finding some of the smaller larvæ dead and dried up, unless perhaps their larger brethren had bitten them, a possibility of which I am by no means sure. So far as I could detect. the larvæ had nothing in their appearance to distinguish them from many other Tineas, being in colour whitish with light-brown heads. They were of sluggish habits, often remaining in one spot for several days, gnawing the hair in their immediate neighbourhood, and leaving a quantity of fine dust and frass. I was not able to detect any larval tube or gallery such as is made by some of the nearly allied species[2], but on becoming full-fed, the larvæ made exceedingly tough cocoons among the hair, of which a considerable quantity was attached. In the cocoons they changed to light brown shining pupæ, almost iridescent in their brightness; and, on the imagines emerging, the pupa-skins were left protruding fully half their length from the cocoons.

The history of *Tinea pallescentella* is interesting. The species appears to have been unknown to science until the year 1851, when it was described by Stainton from a specimen taken under conditions that suggested the probability of it being an imported species, yet all attempts to trace it as occurring commonly at any time on the Continent of Europe or even in America have failed, and, indeed, so far as I have been able to ascertain, comparatively little appears to be known of it on the Continent, and nothing at all in America up to the present time. Its history, taken in chronological order, may be set out as follows:—

1851.—Stainton described *Tinea pallescentella* from a specimen "taken by Mr. Gregson in the streets of Liverpool (perhaps imported)" ("A Supplementary Catalogue of British *Tineidæ* and *Pterophoridæ*," p. 2).

1854.—Stainton repeated his description with the remark: "The above description is copied from my "Sup. Cat."; not having had an opportunity of again examining this species, of which I believe two or three other specimens have occurred in Liverpool" ("Insecta Brit. Lep. Tineina," p. 34). He also mentions it as occurring in the streets of Liverpool, on the authority of C.S.G. (Gregson), and marks it as a species much wanted in collections ("Ent. Companion," p. 48), and includes it in the Catalogue of the British Microlepidoptera ("List of the Specimens of Brit. Animals in the Coll. of the Brit. Museum," Pt. XVI., Lep.).

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[2] Mr. Sennett tells me that he did find what appeared to be a piece of larval gallery in one of the bags of hair, but as a couple of specimens of *Œcophora pseudospretella* also were reared from the hair, the gallery was no doubt made by that species.

1856.—Gregson described a species, which he says "seems to have bred freely amongst rubbish-sweepings in warehouses at Liverpool," under the name of *Tinea nigrifoldella*, but which is clearly referable to *T. pallescentella* ("Zool.," p. 5295).

1857.—Stainton, in some observations on the British Tineina, writes of the species, "This has occurred in some plenty at Liverpool; the larva is granivorous. I give here a more complete description than I was formerly able to give." Then follows a very full and unmistakable description ("Ent. Ann.," 1857, p. 122).

1859.—Stainton tells us that the larva feeds on grain, that the imago appears in August, and is abundant at Birkenhead and Liverpool, and also occurs at Manchester and York ("Manual," vol. ii., p. 293).

Doubleday includes *T. pallescentella* in his list, but ignores *T. nigrifoldella* ("Zool. Syn. List.," p. 27).

1870.—Morris repeats that the larva of *T. pallescentella* feeds on grain, that the imago appears in August, and says that it is "found among grain" ("Nat. Hist. Brit. Moths," Vol. iv., p. 23, Pl. XCIX., fig. 11). *T. nigrifoldella*, he tells us, is found in July, August and September on the walls of grain warehouses in the streets of Liverpool ("Nat. Hist. Brit. Moths," Vol. iv., p. 23, Pl. XCIX., fig. 12). He figures both forms, but although neither figure is particularly good, the two taken together appear to show the chief characters of *T. pallescentella* fairly well.

1871.—Wocke mentions *T. pallescentella* as a species occurring in England, but notes that he has not had the opportunity of personally examining it. He ignores *T. nigrifoldella* ("Staud. and Wocke Cat.," ed. 1871, p. 270, no. 1408).

1872.—Eales records finding a dead and desiccated cat beneath some old gas pipes at South Shields, from which he reared a number of specimens of *T. pallescentella* and *T. rusticella*. He notes that the larvæ devoured the "internal parts of the animal," that the moths appeared during every month from the time he found the cat in July until December, when his notes were written, and that there appeared to be a succession of broods—larvæ, pupæ and imagines occurring at the same time ("Ent. Mo. Mag.," Vol. viii., p. 209).

1874.—Stainton again repeats that the larva is granivorous, and says that the moth is common at Liverpool ("Ent. Ann.," 1874, p. 3).

1875.—Merrin records *T. pallescentella* as occurring from July to October in warehouses and poulterers' shops, and the larvæ in May and June in rabbit, hare and cat skins ("Lep. Calendar," Ed. 2, pp. 55, 133, etc.).

1879.—Hartmann mentions the species as occurring in England on wool, probably introduced with commerce ("Münch. Ent. Ver.," iii., p. 199).

1882.—Porritt states that towards the end of October he found a lot of old sheep's wool, which had been in a Huddersfield warehouse for some months, swarming with Tineæ, and among them were several *T. pallescentella* ("Yorks. Nat.," Vol. viii. p. 94).

1884.—South includes *T. pallescentella* in his list of British Lepidoptera, but ignores *T. nigrifoldella* ("Ent. Synon. List of Brit. Lep.").

1889.—Rebel, in a contribution to the Microlepidoptera Fauna of Austria-Hungary, records that at the beginning of October in 1883 and 1884 he was so fortunate as to take three specimens in all—one male and two females—of *T. pallescentella*, a species "which has not been under observation yet on the continent." He says, "The specimens came in the evening flying against the lamp; sorry I could not discover the larvæ, though diligently searching for them, but I suspect that they have lived inside a preserved heathcock which was in my room." This, he considers, agrees with Merrin's and Eales' observations, and that "Stainton's information—'larva on grain'—is very surprising." He also mentions a specimen being received from Stettin, and gives quite a recognisable figure of the species. He further says, "Ragonet, who saw the female specimen (from which the sketch was taken), defined it as *T. pallescentella*, Stt., but wrote that the name *nigrifoldella*, Gregson, may perhaps claim priority" ("Verhandlungen Zool.-Bot. Gesel. in Wien.," Vol. xxxix., p. 303, Pl. VIII., fig. 7).

R. C. R. Jordan records that "Every year, in some manufactory here (*i.e.*, Edgbaston, near Birmingham), or large warm building, I take two or three specimens of this insect" (*i.e.*, *T. pallescentella*), and adds "The only time that I ever saw it plentiful was in a hairdresser's room, and perhaps this may give a clue to its food." He gives October and November as the time of its appearance ("Ent. Mo. Mag.," Vol. xxv., p. 213).

1895.—Meyrick gives its distribution as England to Durham, East Ireland, its time of appearance as July, August and October and of the larva as May, June, and October, on grain and dry refuse. ("Handbook of Brit. Lep.," p. 791.")

1900.—Kane, in a Catalogue of the "Lepidoptera of Ireland," gives Dublin and Belfast as localities ("Entom.," Vol. xxxiii., p. 127).

1901.—Staudinger and Rebel give England; Vienna; and possibly Germany, as the range of its distribution, and ignore *T. nigrifoldella* ("Staud. Cat.," ed. 1901, p. 238, no. 4588).

1906.—Sich exhibited specimens from Chiswick, where he said it frequently occurs; also from the Strand, London; and gave notes on the species (" Proc. South Lond. Ent. & Nat. Hist. Soc.," 1906-7, p. 89-90).

1907.—Walsingham in notes on *Tinea flavescentella* and other Tineas refers to *T. pallescentella*, giving *nigrifoldella* as a synonym, and gives its bibliography and notes on its distribution and food of the larva (" Ent. Mo. Mag.," Vol. xliii., p. 269).

1912.—Sich in Seasonal Notes on Tineina mentions that among species that came to light in his house at Chiswick in 1911 was a specimen of *T. pallescentella* (" Ent. Record," Vol. xxiv., p. 112).

It will thus be seen that the history of the species, from the time that it was first described by Stainton, in 1851, from a specimen taken by Gregson in the streets of Liverpool " (perhaps imported)," appears to be fairly complete, the records showing that from that time it has gradually spread and become pretty generally distributed over southern England and parts of Ireland. But if imported, from whence did it come? The only definite record of its occurrence in continental Europe that I have been able to trace is that by Rebel of the capture of the three specimens in his study at Vienna. It seems incredible that a species of such comparatively large size, and apparently domesticated habits can have been at all common in any part of the continent and yet have escaped detection; it is, therefore, hardly likely that it can have been introduced from that quarter. Nor does America suggest a likely place of origin, for although Liverpool, where it was first discovered, is in direct and constant communication with that country, large quantities of merchandise of all descriptions continually passing from one to the other, the only American reference to the species that I have been able to trace is that by F. H. Chittenden, who writing in 1897, of species that might be confused with *Tinea granella* says " *Tinea pallescentella*.—This European species has not yet been recorded so far as known from America, but is liable to introduction if not already established here, as it is known to feed in the larval condition upon dry refuse, being even said to attack grain." (U.S. Dep. of Agriculture, Division of Entom. Bull., No. 8 (New Series) 1897, p. 35). If therefore it is, as suggested, an imported species we must seek its place of origin in some remote clime where possibly its habits are very different from what they appear to be in this country.

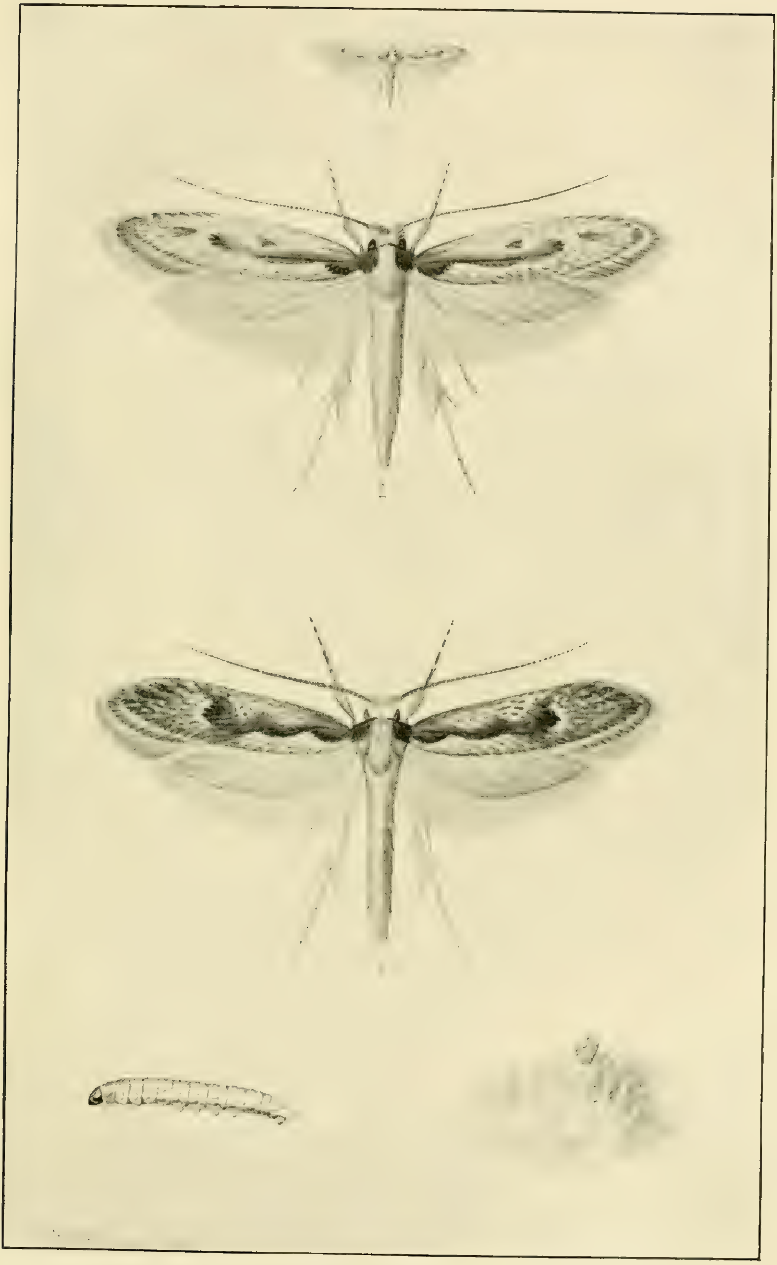
Of its life history we know very little. The imago has been taken in almost every month of the year, usually in or about houses, but Mr. Durrant tells me that he has taken a couple of specimens in the open, in Norfolk, where hare and rabbit skins are sometimes used for manuring the fields. The only definite records we have of the larvæ are those by Gregson in "rubbish-sweepings," but of what the "rubbish" consisted we are not told; by Eales, on the internal parts of a dead and dried up cat, by Porritt in sheep's wool, and those that were given to me from the hare's hair. Whether it has been traced actually to grain is perhaps open to doubt ; but whether that be so or not it is certain that we have in *T. pallescentella* an insect that might in favourable circumstances become a serious pest, and one therefore whose life-history we should take every opportunity of working out. The evident partiality of its larvæ for hair gives one visions of the seats of easy chairs and the mattresses on our beds becoming masses of seething larvæ, untimely holes in our carpets and mangy patches on our wives' furs, as among the lesser troubles that might happen if the species once became really abundant.

EXPLANATION OF PLATE I.

Tinea pallescentella.

1. Imago, natural size.
2. ,, × 4.
3. ,, var. *nigrifoldella* × 4.
4. Larva × 2.
5. Cocoon in hare's hair, with pupa skin protruding after emergence of imago.

PLATE I.



Tinea pallescentella.

Spring in the South Tyrol.

By Ebray Sich & Alfred Sich. *Read May 8th*, 1913.

I associate the name of my son with this paper for two reasons, firstly, because he was my almost constant companion in these enjoyable natural history rambles, and secondly, because owing to his keen eyesight and youthful activity many objects were brought to book which otherwise might have escaped attention. At the same time I would remark that any inaccuracies or shortcomings that there may be in this paper must be attributed solely to myself. There is, I believe, little that is new in the observations here brought forward. My main object being to draw your attention to some of the enjoyments experienced by lovers of natural history, when face to face with the delights of springtime in a sunny land, in a land that harbours a Fauna and a Flora more extensive and varied than those of our own sea-girt and therefore somewhat cloudy Isles.

Botzen (Bozen), one of the principal towns of the Austrian South Tyrol, lies at an elevation of rather less than 900 feet, at the confluence of the rivers Talfer and Eisak. The Talfer is a shallow but rapid river, which flows out of the narrow Sarnthal, above Botzen. Its course is much obstructed by huge boulders, and as it approaches the town, it becomes broken up by masses of shingle, so that the bridge which spans its gravelly bed is of considerable length. There is a fine promenade on its eastern bank. The Eisak, though of considerable volume, is one of those bewitching mountain torrents, which boil and tumble and rush along their courses, as if in unmingled joy. It gathers its waters from near the summit of the famous Brenner Pass, much over 4,000 feet above the sea, and is joined by other streams coming down from the eastern mountains; it reaches Botzen in considerable turmoil, and dashes right across the valley till it is brought up suddenly by an immense wall of rock on the opposite side.

Here the Etsch or Adige, which comes from the Alps on the Swiss border and flows through the Vintschgau, joins the Eisak, and the united waters flow down the Etschtal and subsequently past, but not through, the beautiful Lago di Garda, and finally through the town of Verona, and then into the Adriatic, about twenty miles south of Venice. These streams are too rapid and too shallow for boating, but some good trout may be obtained from the

Etsch. Their beds are too stony to allow of the growth of water weeds, and so, from a naturalist's point of view, they are not particularly interesting. The sunny valley of the Etsch, some two miles wide, runs north-west from Botzen for about twenty miles to Meran, and southwards from Botzen for forty-five miles down to Roveredo. The valley and many of the lower slopes are given over to the cultivation of the vine, and, in later years, extensive apple orchards have been laid out, especially towards Meran. Owing to the dryness of the climate all the land under cultivation is watered by an elaborate system of irrigation. Here and there, it is true, there are reed beds, but these are not extensive. With the exception of this narrow valley, all the country is mountainous. The mountains rise rather abruptly, so that with a stiff climb of two-and-a-half to three hours one can gain an elevation of over 3,000 feet above the sea. One needs to be a good walker to enjoy this country, as there are few roads, except, of course, along the valleys. The wants of those villagers who live on the hills have to be supplied by means of the old-fashioned pack-horse, and it is no uncommon sight to see two or three of these animals climbing up the rocky paths. Except where the mountains rise almost perpendicularly, as they do in one or two places, as for instance along the Seiter Weg, their slopes are well wooded. Small oak trees, which retain their brown leaves through the winter, cover the slopes to a considerable height and then give way to the pines. These smaller mountains are mostly of an elevation of from 3,000 to 5,000 feet, but behind them rise higher masses and peaks, such as the Sarner Sharte, which appears to block up the northern end of the Sarnthal, and the grand mass called the Schlern ; both these are over 8,000 feet, while the beautiful Rosengarten is over 10,000 feet. The spire-like peaks which bear this name are in winter coloured a beautiful rose red by the setting sun. For a short period in the Spring this rose colour changes to orange each night before it fades away. As every one knows, there is some intense and subtle charm about mountains. We regard them as masses of rock which have remained practically unchanged for centuries and yet, viewed from a distance, they change their appearance with every season, even with every hour of the day.

There is one feature of a mountainous country which appears to be unknown to many of the dwellers of the plains. There are certain spots, often of very restricted area, which lie in shelter from the colder winds, but open to every ray of sunshine. In such situations both flowers and insects show themselves long before they do in less favoured spots, and it is in such sunny corners that the observer naturally looks for the first signs of Spring. One of these sheltered places we found on the southern slope of the great Guntschnaberg which rises above the townlet of Gries, where we stayed. The authorities of Gries are very much to be commended for the beautiful walk they have cut up the side of the mountain.

The path rises with many turns among the porphyritic rocks. The lower part is laid out with various shrubs and trees which properly belong to a still more southern clime, but after the Hôtel Germania, and the bridge over the stream have been passed, the visitor will find the surroundings more and more given over to the indigenous vegetation. Here and there, however, large patches of the cactus, *Opuntia*, give quite a non-European feature to the scene. I was told that this plant was originally brought to Gries from America. It has now established itself in many places about the slopes of the Guntschnaberg. From this pleasant sunny path an extensive view of the Etsch valley and the surrounding mountains may be obtained at frequent intervals. This walk is called "Die Erzherzog Heinrich-Promenade," but as I shall frequently mention it, I will shorten the title and call it the Archduke's Walk. There is another interesting walk in Gries which I may as well mention now. This is the Muhlbach Weg. It is a water lane that runs between the vineyards down in the plain. The first part of the lane is walled in with low stone walls, and then one reaches the green turfy path and the stream. On the banks grow willows, cuckoo flowers, and meadow-sweet. Here and there is a bit of flowery meadow land, and when *Celastrina argiolus* and *Gonepteryx rhamni* come flying over the grass, it seems all quite English. However, two or three *Iphiclides podalirius* come sailing along, and *Issoria lathonia* rises from the path; these and the excessive heat of the sun make one think that if it be really England, then one is in bed and in dreamland. Further on, the path runs between extensive vineyards. Here the vines are cultivated in long rows with a short stake to each vine and a long stake fastened at an angle to the short one. The whole arrangement of stakes reminds one of a regiment of soldiers, carrying their rifles over their shoulders. This allows the bunches of grapes to hang down below the leaves and so obtain protection from the fierce rays of the sun. I hope you will now have some idea of the hot and narrow valley, surrounded by mountains, in which lies Botzen and its suburb Gries.

We all know that glorious sunny day in springtime when we see the first *Euchloë cardamines* careering over the meadows, when the air is sweet and when the sunshine brings colour even into the shadows. We all know how that day stirs in us the longings for the ideal joyous life. In England this longing is often confined to the wish that the next day will be as fine as the present, and in Botzen, in 1911, this wish was almost constantly fulfilled. It was with ecstatic feelings that one noticed morning after morning the whole valley bathed in sunshine. The mellow notes of numerous blackbirds rang out in the clear air, and again and again the unclouded blue of the sky gave assurance of yet another brilliant day. It was easy to conceive that with such a glorious amount of sunshine the advance of Spring was rapid and almost continuous. Although the first warm weather of the year did not set in much earlier than it often does in England, yet by the time mid-May was reached the heat was much in excess of that of our hot July days. This continuity of advance added a very great charm to Spring. Every day we saw something fresh. One could almost see the green veil of foliage spreading over the trees, one could almost hear the flower buds burst into blossom. And then great is the joy of being in a country with whose Fauna and Flora one is not well acquainted. One is constantly greeting old friends in the way of animals and plants and mentally saying, "Oh, you are here too!" On the other hand the naturalist, when in a strange country, is also constantly meeting with grand surprises, and is as pleased with them as the old English aurelians were with *Euvanessa antiopa*.

On the 1st February, the day we arrived at Gries, there was still snow in the sheltered corners, and some of the brooks were still frozen over. We had just left Innsbruck, still in the grip of winter, but here, in Gries, the power of winter was already broken, and the earth was throwing off her white mantle. The next day we went up the Archduke's walk, and there met with the first insect (except Diptera) that we had seen. This was a rather bedraggled arctiid larva, probably taking his first airing after hibernation. On February 4th we saw the first lizard, found cases of *Taleporia tubulosa* on some rocks, and heather in bloom. We went up the Virgl by the railway or lift whence one obtains a fine view of the town and surrounding valley. On the pine trees we found a great many nests of the processionary caterpillar, *Thaumetopoea pityocampa*. They seemed particularly fond of the younger trees, and made them look very unsightly. When these nests occur on trees in gardens, they are burnt with torches, but no one seems to take any trouble with them when they occur on trees growing on common land. Many of the pine trees had bunches of mistletoe growing on them. I do not remember seeing this plant on pine before. In this wood it was very common, but always on pine though there were many other trees on which it might have grown.

In one part of the Archduke's walk there was a wall of rock facing the south and covered with a large plant of yellow jasmine. In February this was one of the favourite haunts of that large and handsome bee, *Xylocopa violacea*. This is as large as our largest humble bee and of a deep violet black. The beautiful contrast afforded by the yellow blossoms of the jasmine and the rich violet of the bees as they hovered over the flowers in the sunshine, was one not easily to be forgotten. The flight of this bee is not quite like that of our humble bees, but reminds me sometimes of the flight of *Sesia (Macroglossa) stellatarum*. During our stay we saw, naturally, many kinds of hymenopterous insects, but nothing that appeared out of the common.

The only hemipterous creature that forced its attention on us, was, I am glad to say, not one to cause us any personal inconvenience. In the early Spring, in some places, we saw little colonies of the black and red bug, *Pyrrhocoris apterus*. These conspicuous insects might be seen running over the stones, frequently jostling each other. On the whole they appeared to be of a lively and rather affectionate nature.

We saw the first butterflies on the 6th March, when one *Gonepteryx rhamni* appeared in the garden. In the afternoon we went to the Haselburg, across the river. This is a wooded and rocky slope, and is one of the most northern haunts of the horned viper which, however, we were not lucky enough to meet with, though we saw several stuffed specimens in the museum at Botzen. In our walk towards Leifers we saw *Eugonia polychloros* and *Vanessa io* on the wing, and flying among the birch trees were many specimens of a species of *Brephos*, which we were unable to capture. In many places in the woods at this time the ground was sprinkled over with the blue or white flowers of the *Hepatica*. Most of the flowers were blue, and they stood out brightly against the dark soil like scattered stars. Of bluebells we saw none. On March 12th I saw a butterfly which I had never seen alive before; it was *Libythea celtis* which settled at my feet on the garden path with open wings. In the afternoon we walked up to Rafenstein, one of the numerous old castles with which the district abounds. Among some young oaks we saw a tineid flying, and after much hat-waving, we captured the moth, which turned out to be *Cerostoma radiatella*. One is often meeting with old friends in out of the way places. Many of the weeds in the hotel garden were also old acquaintances. I noticed *Stellaria media*, *Lamium purpureum* and *L. amplexicaule*. The two latter bore larger and more deeply coloured blossoms than they usually do in England. There was the little *Veronica hederæfolia*, and another of the same genus with large and very bright blue flowers. *Chelidonium majus* and *Senecio vulgaris* were growing bravely, and, of course, *Taraxacum officinale* and *Poa annua*. The two last mentioned weeds are, I should say, the two most abundant in central Europe. A very common weed in the vineyards I took to be a species of *Allium*. Of the plants growing among the rocks, perhaps the most conspicuous was *Geranium sanguineum* with its large crimson flowers. In the Sarnthal we found a large plant of *Datura stramonium*; it was too early for the flowers, but the dried stems still retained many of the curious prickly capsules. The first tree to enliven the woodlands was *Cornus mas*. One could see the bright yellow spots they made in the landscape from a long distance. Later on the chief feature was afforded by the numerous wild cherries, *Prunus cerasus*, covered with white bloom and bright green leaves. These trees were much loved by one of the most graceful of the Lepidoptera, *Iphiclides podalirius*. Perhaps the most interesting tree to a northern naturalist, was the nettle tree, *Celtis australis*. There was a very fine one on the Archduke's walk. I should say it was over 30 feet in height and well grown all round.

But in general we found these trees more like our elder bushes, *Sambucus nigra*. I believe they are true natives of the South Tyrol, but owing to their wood being used for whip handles, the young trees for many years past have been collected from the woods and planted in more accessible spots, so that truly wild individuals have become very rare. The leaves are much loved by lepidopterous larvæ for food, several species attacking them, besides the renowned and curious butterfly, *Libythea celtis*. To give an idea of the general climate of this favoured spot, Gries, I may say that there were three fine palm trees in the garden of the Grieserhof, where we were staying. They had braved the winter for many years, and were far too large to be covered up in any way.

About March 17th the first *Papilio* was seen in the garden by my wife, and two days later on the Archduke's Walk we saw *Iphiclides podalirius, Euchloë cardamines*, and one or two of the regular hibernators.

On March 25th *Aglais urticæ*, *Libythea celtis*, *Pieris napi* and *Cyaniris argiolus* were noticed in the garden. The next day a yellow moth was seen on the wing and proved to be our old friend, *Venilia maculata*, an early appearance.

On March 29th, the first *Pieris rapæ* was noted. In the afternoon we walked up to a village, called Jenesien, 3,500 feet. Just below the village we noticed the ubiquitous *Coleophora laricella* on the larches.

March 31st was a grand butterfly day. I found *Issoria lathonia* on the pansy bed in the garden. In the afternoon we went down the valley southward to Branzoll where *Iphiclides podalirius* was very common, very tame, and in splendid condition. In one spot they had discovered some spilt fertilizer which seemed to be very attractive, but for myself I would rather have seen the graceful butterflies flying in little groups over the tops of the cherry trees, when they look best. Our path led us beside the river Etsch, and here *Libythea celtis* was in scores. They were flying about over the road, frequently settling on the bushes or on the road. But I never met any butterfly more wary. We wanted specimens, and though we both tried all the dodges we could think of they always eluded us. They seemed to know that we had no nets and they would *almost* let us take them between our fingers, and yet they always eluded our grasp. After leaving the river we went up through a wood where we saw *Euvanessa antiopa*, and one pale grey form of *Cheimabache fagella*. Later on, passing by some rocks along the road side, we noticed several *Grapta c-album* and *Vanessa io* sunning themselves in the late afternoon. In a wood near here there was a quantity of *Polypodium vulgare*, and many plants of *Asplenium adiantum-nigrum*. In general we did not notice many of the fern family. April 2nd, on the Archduke's Walk, we first noticed the young larvæ of *Diloba cæruleocephala*, on wild cherry; afterwards we found them excessively common everywhere. Next day I found a *Hemerophila abruptaria* in the summer house. April

10th I watched *I. podalirius* laying ova on a plum tree, and took two of the eggs. I told Ebray, who went out and brought in another egg. Later, knowing how to look for them, we found them commonly on wild cherry. On the 12th we saw the first *Leucophasia sinapis*, which afterwards became quite common. April 15th, at Sigmundskron, we saw *Pararge* (*Lasiommata*) *egeria* and *Callophrys rubi*, and from the herbage disturbed *Minoa euphorbiata* and *Ephyra punctaria*. April 17th, *Saturnia pavonia*, female, was presented to us by Herr Hütlinger. In the afternoon we went up about 4,000ft. to Kohlern, where we found ourselves again in early spring as there were many small white or purple crocuses growing in the meadows like they do when artificially planted in our lawns.

April 18th, we discovered *Clytus arcuatus* wandering on the ground around the table on which we were taking our tea out of doors. Beetles in general were abundant. We noticed the ordinary dor beetles were smaller, and of a more vivid blue than the common English species.

April 25th, we went to Klobenstein and saw *Sesia* (*Macroglossa*) *stellatarum* and several Tortrices. Next day a small *Spilosoma mendica* was seen in the garden, and on the following day *Pararge* (*Lasiommata*) *megæra* was seen, and we noticed that the eggs of *Ocneria dispar*, which we had seen some weeks previously in a chink of a rock, had now hatched, and the larvæ were wandering all around for food. April 28th, we saw *Macaria notata* and *Thyatira batis*, and next day I took *Earias chlorana* off a willow. April 30th, we met with a male *Gryllus campestris*, *Eupithecia venosata*, and found ova of *Papilio machaon* on fennel, besides several pupæ of *Aporia cratægi*, on poles bordering an orchard. May 2nd, we saw the beautiful *Anticlea berberata* at rest. There is a large amount of barberry in the hedges of the neighbourhood. May 3rd, we caught *Arctia testudinaria* flying gaily in the early afternoon. It was my first acquaintance with the brightly coloured tiger. Two days later we found *Spilosoma fuliginosa*, and, for the first time alive, *Madopa salicalis*. May 6th, we went to Oberbozen and on the hill side saw *Papilio machaon*, a very large one, the first we had seen, though we had already found the eggs. *I. podalirius* was, in the spring of 1911, far commoner than *P. machaon*. On the same slope we saw several small fritillaries and skipper butterflies, but as we have no specimens I will not offer to give them a name. *Zygæna purpuralis* (I presume it was) was very common; and we saw some specimens of the genus *Ascalaphus* or thereabouts. May 7th, found two larvæ of *Libythea celtis* on the Archduke's walk, as I passed a nettle tree, and the next day we made a search and found many of them in various stages. The smallest we traced back to the empty egg shells on the underside of the leaves, but it was not till last autumn that we were sure we had identified the egg shells correctly. Then we saw the figures of these eggs accompanying Dr. Chapman's article in the *Ent. Rec.*, vol. xxiv., p. 302. May the 10th, we took *Hesperia sylvanus* and *Colias hyale*, and saw—

not for the first time in our lives—*Camptogramma bilineata.* Herr Hüttlinger gave me a specimen of *Lycaena iolas.* This was the first I had seen, but later I saw others, especially at one spot on the Guntschnaberg, where I could watch these lovely blues flying in the burning sun over the bushes of *Colutea arborescens.* Near this spot I found one morning a fresh specimen of the beautiful noctuid, *Grammodes algira*; this was quite a grand surprise. I also took *Scolitantides orion*, but this was not in good condition.

To many people, the lizard is a loathsome creature and venomous withal, but to a naturalist of the cloudy North, the lizard is one of the charms of a southern land. I will not pretend that he is wholly without guile, for when one lizard has set his mind on a fly or a larva and another has the same warm desire for that particular insect, there will be a strenuous fight, which generally ends in one or both combatants falling off the wall into the dusty road, and scuttling away into the dusty herbage. But in general the lizard is a sprightly and attractive little creature with an inordinate love of the burning rays of the sun. There he will lie hour after hour, in perfect contentment, pressed flat against a hot stone with the sun's heat pouring down on his scaly back. You put out your hand to stroke him, and in a twinkling he has vanished down a hole in the wall. In a minute or so you will see his head at the entrance of the hole, and, if you remain quiet, he will presently crawl up and resume his sun bath. The colour of these little lizards, in Bozen, is usually some tint of mottled brown, but occasionally they assume a greenish hue, and more rarely an almost orange colour. They occur on every sunny wall. These walls are built of stones and contain many crevices in which the lizards spend the wet days and the winter. It is said, they do not retire till December, and in 1911 some of them were active again before the middle of February. They are more abundant on the sunny walls than on the rocks on the hillsides, but even here they are quite common. We often saw them chasing each other along the paths in the Archduke's walk, and when very excited they spring though the air just above the ground for a few inches. There was a wall in the Mühlbach Lane on which lizards were especially abundant. There were certain individuals which I saw nearly every morning for about two months, they were nearly always on their own special stones and they had their own holes. On the same wall were several individuals which had met with an injury to their tails, a most common occurrence. These lizards, like other species have the power of growing new tails to replace those lost, and instead of one they often grow two tails. On this wall there was one with three tails; it had two tails and one of the two was branched. In size these lizards varied from the small ones, which had just passed their first winter, to elderly reptiles of some seven inches. These were the *Lacerta muralis*, or wall lizard.

On February 23rd, I felt sure that real spring had set in for good. We were walking on a road cut on the face of a steep and wooded precipice, and discovered a fine male *Lacerta viridis* basking in the sunshine beside a large stone. He was at least, with his long tail, fifteen inches in length. The vivid green of his body and the beautiful blue of his throat showed that he had been out of his winter quarters for some days. The movements of this lizard are exceedingly swift. In Italy I have tried to catch this species with a butterfly net as it rushed along a hedgerow, but without success. On this occasion our polite advance was answered by a rapid retreat into a neighbouring hole in the rock. This species seemed fairly common in the neighbourhood. Only one blindworm was noticed. It was not until May 8th that we saw the first snake. It was coiled up on the top of a garden wall preparing to slough. A few days later I saw it in the same place in its new skin, when it appeared quite black. Later on I saw several of these black snakes which Mr. Boulenger, F.R.S., has kindly informed me, belong to the species known as the whip-snake (*Zamenis gemonensis*). They were very quick in their movements, and made quite a noise when they happened to glide over any dead leaves. Though I managed to touch two of them with my stick, they did not attempt any defence, their only idea being apparently that of escape. The larger ones must have been nearly three feet in length. Though they do not attack human beings they are snakes, and as such are greatly feared by the ignorant. Adders are said to be very common in the district, and probably are; but though I looked over many likely places, I failed to find any. On May 3rd we walked in the Sarnthal, and noticed that some muddy water in a deep cart rut was in an agitated condition, though there was no wind. By means of our sticks we drove out a toad, which immediately went quite flat, putting its limbs over its back. It looked exactly as though a cart-wheel had run over it. We turned it over and found its under parts adorned with orange. It reminded me of the Fire Toad, *Bombinator igneus*, which I had previously met with in Germany; but it was a larger and greyer species, and orange instead of deep red beneath. I have since identified it as *Bombinator pachypus*. There were several in this cart rut, but we failed to find any in the pools about the rocky bed of the adjacent river, Talfer. I was glad to see them, as the species was quite new to me. It is stated in the "Cambridge Natural History" (p. 155) that the secretion of the skin of this species is exceedingly poisonous and that it folds its limbs over its back when frightened, to show the warning colour beneath. We noticed edible frogs in a reedy pond in the valley, and the common salamander was to be found, but we only saw specimens taken by other people. Quadrupeds appeared very scarce. I believe we did see a wild mouse or two in the woods. Birds were more abundant. The two most common of the district were the blackbird and the chaffinch, the former in the gardens, and the latter everywhere. Chaffinches hopped about the roads in the town, like our sparrows, which were not abundant at Bozen. Song thrush and missel appeared to be absent; I neither saw nor heard either of them. We once saw some dead fieldfares hung on a string for sale in the market. A party of goldcrests were seen enjoying themselves in some pine trees on the Virgl and twice we saw families of long-tailed tits. Magpies were common on the hills above the plain and we saw and heard one raven. The common redstart was quite frequent in the gardens. The bird that most interested me, however, was the blackstart. There was a pair in the Muhlbach Weg, and another near Sigmund'skron. These quiet and handsome birds seem to prefer the back garden of some little cottage, especially if there should be an old wooden shed where they can build their nest. They are very tame. One morning I noticed the cockbird sitting on the cottage roof singing, but that was the only time I heard the song. Mollusca were not particularly abundant, except *Agriolimax agrestis*; but one afternoon we found a very fine specimen of *Limax cinereo-niger*. One afternoon when busy among the ruins of the castle of Sigmund'skron, turning up stones in search for snails, I all but put my hand on a scorpion. Needless to say, after that I was more careful. *Limnæa peregra* and *L. stagnalis* occurred in a reedy pond in the valley.

In conclusion, I may remark that this paper does not include all our doughty deeds or perilous misfortunes in this lovely country. How for instance, Ebray found a fine larva of *Apatura ilia* (subsequently bred) on a Lombardy poplar and, ascending the tree in hopes of getting more, came down covered with débris and with a large catocalid larva on his shoulder. How again, late one February afternoon, we were purposely led astray in a dense wood by a sinister individual whose establishment we had refused to patronize.

On May 23rd, our stay in Gries came to an end. The freshness of spring was then rapidly passing into the ardent fulness of early summer.

Appendix.

Some tineid and other moths observed near Bozen in 1911.

Apterona crenulella. I found several of the snail-like cases of this species at the top of the Archduke's walk. The case is sinistral, whereas in the majority of snails the coiling of the shell is dextral.

Simæthis fabriciana, Oberbozen, May 6th.

Glyphipteryx haworthana, Gries, April 30th.

Cerostoma radiatella, Rafenstein.

Metzneria carlinella? Larvæ, probably of this species, were found in the head of a carline thistle.

Lita æthiops. On the heath below Oberbozen, April 21st. Two or three on the wing. *Ematurga atomaria* flying at the same time

Epithectis mouffetella. One larva on honeysuckle, Sigmund'skron.

Ypsolophus ustulellus. Several in a small wood near Sigmund'skron, April 28th. We found them sitting on nettles and other low plants after the manner of *Abraxas sylvata*, but they were much more lively.

Ypsolophus fasciellus. On the Calvarienberg, May 16th. These were of the usual size. Dr. H. Rebel mentions finding very small specimens of this species in the same place, in July, 1892, which he rightly says were undoubtedly a second brood.

Symmoca caliginella. Took three off leaves of comfrey, Gries, May 3rd.

Depressaria applana. A hibernated specimen at Sigmund'skron April 15th.

Borkhausenia augustella. Three specimens, Gries, May 1st.

Scythris chenopodiella, Calvarienberg, May 14th.

Coleophora lixella. On the wing, May 5th, Sigmund'skron.

Coleophora hemerobiella. An old case, undoubtedly this species, on a cherry tree.

Elachista triatomea, one, Gries, April 16th.

Gracilaria stigmatella }
Gracilaria elongella } Sigmund'skron, April 28th.

Ornix torquillella, May 2nd.

Lithocolletis hortella, bred, oak, Gries.

L. alniella }
L. frœlichiella } Among alders, Sigmund'skron, April 28th.

Lithocolletis cerasicolella, at rest on old cherry trees, April 15th, Sigmund'skron.

Lyonetia clerkella, Gries, abundant in an orchard, April 27th.

Nepticula freyella, three bred from mines in *Convolvulus arvensis*, gathered beside a dusty road, Gries, May 7th.

Tinea cloacella, Gries. We also saw two *Tinea*, sp ? smaller and whiter than this, but not *T. granella*.

Nemophora swammerdammella, April 15th.

Adela viridella, Gries, April 18th.

A. degeerella, Sigmund'skron, May 19th.

A. fibulella, in blossoms of *Veronica*, May 8th, on the Calvarienberg.

Zamenis gemonensis. At Bozen this snake appears in a melanic form; it is not usually black.

One of our Common Butterflies, Epinephele jurtina.

By Hy. J. Turner, F.E.S (*Read May* 22*nd*, 1913.)

Mr. Hy. J. Turner read extracts from a lengthy paper intended as an illustration of an "antiquarian research" into the literature of Entomology, to show the growth of our knowledge of a species and its congeners, and the attempts to fix that knowledge by generic, specific, and varietal names. The following is merely an indication of the sources and some results of the study:—

1602. Aldrovandus.—"De animalibus insectis." Bologna. The first figure and reference. Plate 246, fig. 13.

1634. Thos. Moufet.—"Insectorum sive Miniorum Animalium Theatrum." London. A rude text figure, recognisable. Part I., Chap. 14, page 103.

1666. Christopher Merrett.—"Pinax Rerum Naturalium Britannicarum." A crude description on page 198 of this little pocket-book.

1696. James Petiver.—"Musei Petiveriani Centuria." London. Figures of the two sexes. No. 308 female, no. 309 male.

1710? Petiver.—"Gazophylacii naturæ et artis decades 10." London. Plate 5. Golden meadow-eye. Figures male and female, up. and under. (See "Opera.")

1710. John Ray (edited Lister).—"Historia Insectorum." Describes the male, no. 16, the female, no. 17, on page 124, and says that one (16) is the male of the other (17) as he "suspects."

1715. Christian Sepp.—"Beschouwing der Wonderen Gods," vol. i. Figures the "brown sand-eye" female (up. and und.), larva, pupa (suspended from grass-stem), and ovum largely magnified. Plate V., page 29.

1720. Eleazar Albin.—"Natural History of English Insects." London. A picture book. Four badly-shaped figures and one of a larva, but not of a Satyrid. He shows both sexes, and says that the insects were bred from larvæ which fed on grass. Plate 53.

1734. Réaumur.—"Mémoires pour servir à l'Histoire des Insectes." Placed in his Class III. (two front legs abbreviated, but fully formed). Vol. i., page 270, Plate XI.

1746. Linneus.—"Fauna Suecica," Ed. 1, page 239. Describes the species and calls it *coridon*.

1748? Benjamin Wilkes.—"English Moths and Butterflies."

London. Vol. iii. Figures male, female, and larva. Calls the species *hyperanthus*.

1758. Linneus.—"Systema Naturæ," Ed. x. Holmia. No 104 named *jurtina*=female. No. 106 named *janira*=male. Placed in the *Nymphalis* section of *Papilio*. Two species. Page 475.

1760? Rösel and Kleemann.—"Insekten-Belustigung." Two very good figures. Vol. iii., Plate 34, page 209. Uses name *jurtina* (immediately after Linneus).

1761. Nicolaus Poda.—"Insecta Musei Græcenensis." (Gratz.) Widmanstäd. First application of Linnean classification to a local fauna. Two species. A trivial aberration, B.I., noted, in which the hindwings are not ocellated. Page 69. No. 19 *jurtina*. No. 20 *janira*.

1761. Linneus.—"Fauna Suecica." Ed. alt. auct. Stockholm. Two species, page 276.

1763. Scopoli.—"Entomologica Carniolica." Has seen *janira* and *jurtina in côp.* Describes without naming, six trivial varieties. Page 157.

1764. Otto Fried. Müller.—"Fauna Frederichsdalina." Describes as two species, but has seen them *in côp.* Page 54.

1764. Geoffroy.—"Histoire abrégée des Insectes." Paris. Describes *Papilio corydon*=*janira* and *P. myrtillus*=*jurtina*, and places them in his division *Tetrapi* (four-footed) of the Linnean *Papilio* (larvæ without spines; imaginal front legs aborted). Vol. ii., page 49.

1764. Gronovius.—"Zoophylacium Gronovianium." No. 778. Cites previous authors. Page 195.

1766. Hufnagel.—"Berlinisches Magazin." Vol. ii. List of butterflies with *P. pamphilus*, which can be no other than this species (*jurtina*). Page 76.

1766. Linneus.—"Systema Naturæ," Ed. xii. Müller quoted as evidence that *janira* and *jurtina* are one and the same species. Placed in the *Nymphales* division of *Papilio* as having edges of wings indented and in the *Gemmati* subdivision, wings adorned with eyes. Vol. i., page 774.

1766. Moses Harris.—"Aurelian." London. Various stages of "Meadow-brown Butterfly" figured. States that the larval stage lasts nearly eleven months. Plate 32.

1767 Moses Harris.—"Essay . . . Wing-tendons of Butterflies and Genera." London. Puts the "Meadow-brown" in the genus *Argus*.

1769. John Berkenhout.—"Outlines of the N.H. of Gt. Britain." No. 16 of *Papilio* is named *P. jurtina*.

1773. Benjamin Wilkes.—"One hundred and twenty Copperplates of English Moths and Butterflies." A most brilliant figure named "Meadow-brown." Plate 101, page 53.

1775. Fabricius.—"Systema Entomologica." Two descriptions and two names. Cites Scopoli that they are sexes of one species. Page 497.

1775. Von Rottemberg.—"Der Naturförscher." Annotates Hüfnagel's List in "Berl. Mag." of 1766; determines *P. pamphilus* as the *jurtina* of Linneus, and says that from his own observations *janira* is the male sex of *jurtina*. Vol. vi., page 9.

1775. Denis and Schiffermüller.—"Systematisches Verzeichniss der Schmetterlinge der Weiner Gegend." Reference to the marked dimorphism of sexes in *jurtina*. Places it in the class "Larvæ subfurcatæ" = the "Pap. Nym. Gemmati" of Linneus. Page 167.

1775. Fuessley.—"Verzeichniss Schweizerischen Insecten."

1776. O. F. Müller.—"Zoologiæ Danicæ Prodromus." Both these authors assert *janira* as the male of *jurtina*.

1777 etc. Esper.—"Die Schmetterlinge in Abbildungen." Number of very good figures of *janira*, including ovum (magnified, with a pictorial micropyle), and a remarkable aberration with forewings white, except the orange area and hindwings brownish cream, without eye spots. Vol. i., Plates v., xxiv., lxxxii.

1777. Scopoli.—"Introductio ad Historiam Naturalem." Puts *jurtina* in section C. of the genus *Argus*, and says it is characterized by being eyed and blotched without bands.

1779 etc. Ernst and Engramelle.—"Papillons d'Europe." Vol. i., Plate xxviii., eight figures of "Le Mirtil," with one larva and one pupa. Vol. ii., Plates lxvi. and lxvii., nine figures. Represent aberrations in colour, markings, and number and development of eye spots.

1779. Jacob Christian Schæffer.—"Icones Insectorum circa Ratisbonam indigenorum." Several figures called "Pap. tetrapus integris vicesimus tertius," "P. tert. . . . quintus," and "P. tert. . . . septimus." Plates 242, 273.

1781. Fabricius.—"Species Insectorum," Vol. ii. Gives precedence to *janira*.

1785. Fourcroy.—"Entomologia parisiensis," Vol. ii., p. 239. Calls th especies *P. myrtillus*, after Geoffroy.

1787. Fabricius.—"Mantissa Insectorum," Vol. ii. Repeats his precedence to the name *janira*. Page 44.

1787. Schneider.—"Systematische Beschreibung." Gives *janira* in this small pocket book. No doubt copied from Fabricius.

1788? Gmelin.—"Systema Naturæ." English edition of Linneus. Gives the two as separate species. Doubts the truth of O. F. Müller's observation of pairing. Vol. i., pt. v., page 2,303.

1786. Esper.—"Die Schmet. in Abbild." Plate xcvi. *P. erymanthea*, a remarkable figure of a Satyrid with eyespots at apical and anal angles of all four wings on upperside, and nearly full row of ocellations on underside of all wings. Tutt (*in litt.*) says, "It seems doubtful whether it is not a variety name from a single specimen." An examination of the figure suggests no other species. The specimen came from Hungary.

1788. Borkhausen.—"Eur. Schmetterlinge." Vol. i. Puts *janira* in the 4th Family, Oreaden, of his 1st Horde of the Nymphen.

1790. Peter Rossi.—"Fauna Etrusca."

1793. Fabricius.—"Entomologia Systematica emend. et auct." Both these authors give precedence to *janira*.

1795. Lewin.—"Insects of Great Britain." Figures of the "Meadow brown argus."

1795? Hübner.—"Samlung. Eur. Schmett." Several poorly coloured and poorly drawn figures, and one wrongly named *jurtina*, subsequently corrected to *eudora* = *lycaon*. He uses *jurtina* and not *janira*.

1796. Herbst.—"Natursystem." Vol. viii. Plate 202. Uses name *janirus*.

1798. De Prunner.—"Lepidoptera pedemontana." Page 17. Uses *janira*.

1799. Ljungh.—"Insects of Nya." ("Kon. Vet. Acad. Nya Handl.," Vol. xx., page 147). *Pap. brigitta.* Plate ii. Doubtful as this species. Put among the Danai candidi, *i.e.*, Pierids, but has "four feet," hence a Satyrid. Possibly a white extreme aberration.

1800. Esper.—"Die Schmett. in Abbild." Plate 113. Figures a small Satyrid which he calls *P. janirula*. Kirby calls it a var. of *janira*. Tutt (*in lit.*) suggests *lycaon*.

1801. Schrank.—"Fauna Boica." Vol. ii., Pt. I. Describes *Maniola lemur*. Says that the male is *jurtina* and the female *janira*. He changed the sexes, and both the generic and specific names. Page 175.

1801. Donovan.—"British Insects." Vol. ix. Plate 320. Gives three figures of *jurtina*.

1802. Haworth.—"Prodromus Lepidopterorum Britannicorum." Places *jurtina* in his 5th genus of *Nymphalis*, the *Gemmati*.

1803. Haworth.—"Lepidoptera Britannica." Vol. i. Our Meadow-brown called *jurtina*. He is sure of the sexes as he has observed the two *in cóp.*

1804? Hubner.—"Eur. Schmetterlinge." Vol. i. Figures and describes in Text *P. hispulla* from Portugal, as a form of *janira*. He has now adopted the name *janira* in place of the *jurtina* of his previous work. Figs. 593-6.

1805. Latreille.—"Hist. Nat. Crust. et Ins." (Buffon's Nat. Hist.) Places *janira* in the third section of the genus *Nymphalis*, the *Satyri*.

1807? Esper (or Charpentier).—"Die Schmetterlinge." Vol. ii. Discusses *P. hispulla* as "an essentially different species."

1807. Ochsenheimer.—"Die Schmetterlinge von Europa." Vol. i. Describes *janira* and its life history, with *hispulla* as a "large variety brought about by climate."

1809. Latreille.—"Genera Crus. et. Ins." Part 4. Places *janira* in B section of *Satyrus* division of the genus *Nymphalis.*

1815. Leach.—Article in "Edinburgh Encyclopedia." Vol. ix. Puts *janira* in the genus *Hipparchia.*

1816. Dalman.—"Kong. Svensk. Akad. Hand." States that *P. brigitta* of Ljungh is undoubtedly an aberration of *janira.* Page 83. Places all Satyrids in *Erebia*, a genus of Division II. of *Tetrapodes.*

1816. Hubner.—"Verzeichniss bekann. Schmetterlinge." Creates genus *Epinephele* in which he places *janira* (*jurtina*). The 6th genus of his family *Nubilæ* (D) of the Stirps (IX) *Oreades.*

1816. Ochsenheimer.—"Eur. Schmett." Vol. iv. Places *janira* v. *hispulla* in the second part of the genus *Hipparchia.*

1819. Latreille.—"Encyclopédié Méthodique." Vol. ix. Places *janira* in the group (H) of his genus *Satyrus* (185 species).

1819. Samouelle.—"Entomologists useful Compendium." Refers *janira* to the *jurtina* of Linneus and Haworth, and puts it in the genus *Hipparchia.*

1823. Godart.—"Encylop. Method." Discusses *hispulla* and *erymanthea* as varieties of *Satyrus janira.* Pages 539-541.

1828. Stephens.—"Illustrations: Haustellata." Vol. i. Discusses the variation met with, and describes Var. B. Pale ochreous tinged with coppery, with dusky patch at the base. Page 59.

1829. Stephens.—"Systematic Catalogue." Puts *janira* in the second section of the genus *Hipparchia.*

1829. Meigen.—"Sys. Beschreib. Eur. Schmett." Adopts the genus *Maniola* for the section of the Satyrids containing *janira*, etc.

1829. Boisduval.—"Index Methodicus." Uses only one genus *Satyrus* for the whole of the butterflies we now know as Satyrids.

1834. Treitschke.—"Die Schmett. v. Eur." Details facts to establish *hispulla* a var. of *janira.*

1835. Herrich-Schäffer.—"Nomenclator Entomologicus." Places all the Satyrids in the one genus *Hipparchia.*

1839. Wood.—"Index Entomologicus." Figures ordinary British forms, and puts *janira* in the genus *Hipparchia.*

1840. Boisduval.—"Index Methodicus." Subdivides his omnibus genus *Satyrus.* Puts *janira* and *tithonus* into a separate section of his now very restricted genus *Satyrus.*

1840. Zetterstedt.—"Insecta Lapponica." Puts *janira* in genus *Satyrus* with all other Satyrids of his country.

1841. Westwood and Humphreys.—"British Butterflies." The species *janira* is put in the genus *Hipparchia*. Vol. i., Plate 20. Says Wilkes and Lewin call it *hyperanthus*.

1843. Herrich-Schäffer.—"Sys. Bear. eur. Schmett. (Catalog.)." Vol. i. Divides his previous genus *Hipparchia* into eight genera. Puts *hyperanthus*, *janira*, and *tithonus* into the genus *Epinephele*.

1843. Herrich-Schäffer.—"Supplement of Plates." Figures 104-5, an aberration in which the hindwings are quite white above and below.

1847. Zeller.—"Isis." ("Cat. Lep. Turk. and Asia.). Describes *Hipparchia telmessia*, long held subsequently to be a form of *janira*. Page 4.

Ditto.—Page 136. Quotes from Costa's "Fauna de Regno di Napoli" concerning *Hipparchia janira* var. *hispulla*, and gives details of a series of ten more or less trivial aberrations.

1846-52. Doubleday, Hewitson, and Westwood.—"Genera of Diur. Lep." Place *janira* in the genus *Satyrus*.

1856. Stainton.—"Manual." Puts *janira* in the genus *Hipparchia*. Vol. i., page 28.

1859. Doubleday.—"Syn. List of Brit. B. and M." Places *janira* (*jurtina*) in the genus *Satyrus*.

1861. Staudinger.—"Catalog.," Ed. 1. Puts *janira* in *Epinephele*.

1865. Herrich-Schäffer.—"Prodromus." Discards his eight genera of Satyrids of 1843, and puts *semele*, *hyperantus*, *tithonus* and *janira* in the genus *Satyrus*.

1867. Snellen.—"De Vlinders van Nederland." Places *janira* in *Epinephele*. Page 48.

1869. Butler.—"Cat. Diurn. Lep. descr. by Fab." Places *janira* in *Epinephele*.

1871. Newman.—"Ill. N.H. of Brit. Butt." Figures and describes several albinistic aberrations of *janira*. Pages 91-2.

1871. Staudinger.—"Horæ Soc. Ent. Rossicæ." Vol. vii. (in *Beit. z. Lep. Faun. Greich.*) Discusses *telmessia* and *hispulla* as forms of *janira*. Page 79.

1871. Kirby.—"Syn. Cat. Diur. Lep." Uses the prior name *jurtina*, putting it in the genus *Epinephele*. Takes *pamphilus*, Hufn., and *lemur*, Schrank, as synonyms. Treats *janirula*, Esp. as a variety. Considers *erymanthea*, Esp., and *telmessia*, Zell., as sub-species.

1871. Staudinger.—"Cat. Eur. Lep." Uses *janira* in the genus *Epinephele*. Treats *janirula* as a form of *lycaon*.

1879. Marott.—"Giornale di Sci. Nat. ed Econ." Palermo. Vol. xiv. Discusses *hispulla* as var. of *Epinephele janira*. Page 54.

1881. Gianelli.—"Il Naturalisto Siciliano." Describes albinistic forms of *hispulla*. Page 34.

1882. Kirby.—"Eur. Butt. and Moths" Page 40. Reverts to *janira* in place of his former *jurtina*.

1881. Lang.—"Rhopalocera Eur." Plate 7. Gives figures of a Spanish form of *hispulla*.

1885. Kane.—" Hand. Eur. Butt." Page 125. Speaks of intermediate forms towards *hispulla* as occurring in Switzerland.

1889. Alpheraky.—" Romanoff Memoires." Vol. v. Describes *fortunata* as a form of *Epinephele janira* from Orotava.

1889 ? Dale.—" Hist. of Brit. Butterflies." Puts *janira* in subgenus *Satyrus* of the genus *Hipparchia*. Describes its roosting habit.

1889. Dr. Girod.—" Rev. of Auvergne, and Rev. Sci. du Bourbon." Vol. ii. Describes *Satyrus janira* ab. *lactea*.

1890 ? Mosley.—" Illus. of Varieties of Brit. Lep." Part 4. Illustrates several very remarkable aberrations and the ab. *splendida* of Buchanan White. Genus *Satyrus*.

1889. Miegen.—" Naturaliste." Describes ab. *pallens* of *janira* from the Pyrénées Orientales. Page 74.

1892. Fuch.—" Jahrbuch Nass. Ver.," Vol. 45. Describes ab. *cinerascens* of *Epinephele janira*, from the Rhenish Provinces.

1893. C. G. Barrett.—" Lep. Brit. Isles." Plate 33. Gives plate of aberrations and puts *janira* in *Epinephele*.

1894. Hoffman.—" Schm. v. Europe." Figures ordinary form and copies Esper's figure of the ovum a hundred years before.

1895. Rühl.—" Palaearktichen Grosschmetterlinge." Refers to a gynandromorph taken by Madam Lienig in Kurland. Gives an instance of aberrant copulation between a male *janira* and a female *Aglais urticæ*. Describes var. *kurdistana* from Kurdistan. Discusses at length most of the hitherto known forms.

1896. " Ent. Record," Vol. vii., Plate 2. Figures of pale blotched forms of *janira*.

1896. Mosley.—" Nat. Journal (Ill. of Vars. of Brit. Lep.)." Gives three figures of "freeks" (!) of *janira*. Plate 2.

1896. J. W. Tutt.—" Brit. Butterflies." Gives summary of the potential variability of *janira*. Describes ab. *suffusa* and ab. *grisea*. Pages 403, 404.

1896. Kirby.—" Handbook to the Order Lepidoptera." Adheres to *janira*.

1901. Staudinger.— " Catalog." Doubts the identity of *telmessia* with *jurtina*, as he now calls it. Considers *kurdistana* to be a form of *telmessia*.

1902. Lambillion.—" Papillons de Belgique." States that nothing definite is yet known as to whether the species hibernates as an ovum or as a larva.

1902. South.—" Entomologist," Vol. xxv. Describes an underside aberration.

1908. Gillmer.—“Ent. Wochenblat.” Describes an ochre yellow form of male *jurtina*.

1903. Verity.—“Lep. Rhop. scop. recent. Tosc.” (Riv. d. Ins. Vol. i.). Figures symmetrical white-blotched aberration of the ab. *semialba* of Bruand. (Reproduced in “Ent.,” 1904, plate 4.) Describes and names the eyeless form of *jurtina* as ab. *anommata*.

1903. Mousley.—“Ent. Record.” Vol. xv. Describes the form with more than a normal number of spots as ab. *addenda*, page 168.

1903. Rev. G. Wheeler.—“Butterflies of Switzerland.” Analyses the potential variation (Upperside, underside, ocelli on underside, additional spots on upperside, small spots below the apical ocellus). Describes ab. *violacea* from Aigle.

1903. Lambillion.—“Revue Mensuelle.” Namur. Page 66. Describes ab. female *marmorea* and ab. male *nigro-rubra*.

1904. Lambillion.—“Revue Mensuelle.” Namur. Page 66. Describes and names (!) a symmetrical malformation as *costa-cava*.

1905. Gillmer.—“Notes on Butt. capt. in Switz. by Busack.” (“Arch. Ver. Fr. Nat. Meckl.”) Discusses second generation of *janira*.

1906. South.—“Butt. of the Brit. Isles.” Figures the ovum on a blade of grass, absolutely different from Esper and Hoffmann’s “illuminative” figure.

1908. Seitz.—“Mac. Lep. World., Pal. Rhop.” Vol. i. Accepts name *jurtina*. Calls *lemur* and *pamphilus* synonyms. Uses the genus *Epinephele*. Introduces ab. *cinerea* of Cosmov and ab. *rufocincta* of Fuchs.

1912. Le Cerf.—“Bull. Soc. Ent. Fr.” Page 225. Discusses genitalia of *Epinephele jurtina* and its supposed races. Separates *telmessia* and *jurtina*. Puts *kurdistana* with the former and *fortunata* and *hispulla* with the latter. Describes var. *persica* as a new subspecies of *jurtina*.

1913. Bonaparte Wyse.—“Irish Naturalist.” Describes a form of *jurtina* with more than one additional spots on the forewings below the apical spot.

ADDENDA.

1793. Fabricius.—Puts *janira*, etc., in a genus subsequently diagnosed and named as *Hipparchia* in

1807. Illiger’s Magazine, Vol. vi., page 279, and including 119 species of satyrids.

British Short-horned Grasshoppers.

By W. J. Lucas, B.A., F.E.S. (*Read October 9th*, 1913).

Last year I read before this Society a short paper on the British members of one of the subdivisions of the Orthoptera—the Forficulodea. On the present occasion I wish to call your attention to another—the Acridiodea.

You will perhaps recollect that the Orthoptera were divided into the following groups or sub-orders:—

1. *Forficulodea* (Earwigs, etc.).
2. *Blattodea* (Cockroaches).
3. *Mantodea* (Praying Insects).
4. *Phasmodea* (Stick Insects).
5. *Gryllodea* (Crickets).
6. *Locustodea* (Long-horned Grasshoppers).
7. *Acridiodea* (Short-horned Grasshoppers).

Included in the Acridiodea are immense numbers of grasshoppers, which may be defined as:—*Orthoptera with hindlegs longer than fore- or mid-legs and having their femora wider towards the base; the "ear" on the first segment of the abdomen, at the side, towards the top, the "music" being produced by hind-leg and elytron; antennæ short; tarsi with three joints; ovipositor not conspicuous, composed of four short valves.*

We may divide the Acridiodea into nine families.

1. *Tetrigidæ.*
2. *Pneumoridæ.*
3. *Mastacidæ.*
4. *Proscopiidæ.*
5. *Truxalidæ.*
6. *Œdipodidæ.*
7. *Pyrgomorphidæ.*
8. *Pamphagidæ.*
9. *Acridiidæ.*

Two only of these contain British representatives, the Truxalidæ and Tetrigidæ—nine species being found in the former family, and two, belonging to the genus *Tetrix*, in the latter. The typical family Acridiidæ, containing the migratory locusts, includes no species native to Britain. It is fortunate that, though we possess so few species, and most of those we do possess are small, yet they give a good idea of the Acridiodea as a whole.

In some cases the eggs are elongated, slightly curved cylinders with rounded ends, but how far this is general in the group I cannot say. The female, with the valvular processes at the extremity of her abdomen, excavates a hole in the soil and there places the eggs, providing them at the same time with a protective covering, which gives a hint of the relationship of the Acridiodea to the Blattodea, which latter place their eggs in a horny case. After hatching there are some half-dozen moults, the wings gradually developing as the insects grow to their full size. There is, in fact, but little post-embryonic development, a true pupal stage being absent, the insects being nymphs from the time of hatching till they reach maturity.

Food appears to be in general of a vegetable nature. Most of our species eat grass, holding on to a blade with their legs and biting downwards along its edge. The Tetrigidæ, however, are not unlike earthworms in the nature of their food. They seldom browse off higher plants, confining their attention to lichens, mosses and the surface soil, which contains different forms of low plant-life.

To everyone the "song" of the grasshopper is familiar, and every naturalist will appreciate the words of the poet Keats who says:—

> "When all the birds are faint with the hot sun,
> And hide in cooling trees, a voice will run
> From hedge to hedge about the new-mown mead;
> It is the grasshopper's . . ."

The chirp is produced by the rubbing together of the outer surface of the elytron and the inner surface of the hind femur. A series of small teeth on the latter scrape against a projecting vein on the former, and thus produce the sound, as may easily be tested experimentally with a recently killed insect.

There is often some considerable difficulty in distinguishing neighbouring species of the Acridiodea. Owing to their great capacity for assimilating their colouring to that of their environment they are subject to great variety in coloration. Hence colour must be but little relied on for distinguishing species. For purposes of classification the following are some of the points that need attention, and it is chiefly on these that the accompanying identification table has been founded :—

1. The presence or absence of a pad between the tarsal claws.
2. The foveolæ of the vertex—little triangular or quadrangular depressions on each side of the top of the head.
3. The tip of the antennæ.
4. The colour of the palpi.
5. The distal part of the pronotum.
6. The three longitudinal ridges of the pronotum.
7. The presence or absence of a tooth at the base of the ovipositor.
8. The mediastinal and discoidal area of the elytron.
9. The amount of development of the organs of flight in the imago.

In the sketch of the elytron of *Stauroderus bicolor* the arrangement of the nervures and areas between them are named. The hindwing is of less importance for distinguishing the species.

BRITISH SPECIES OF ACRIDIODEA.

A. Pronotum not extending beyond thorax; a pad between the tarsal claws.
  (*a*) Foveolæ of vertex almost absent; species large .. *M. grossus.*
  (*b*) Foveolæ of vertex well marked; species smaller.
    (i.) Antennæ not clubbed.
      1. Tooth at base of ovipositor; large discoidal area, with regular reticulation .. .. *S. lineatus.*
      2. No tooth at base; irregular reticulation in a smaller discoidal area.
        (*a*) Narrow undilated mediastinal area, extending far beyond middle of elytron.
          (i.) Greenish; palpi unicolorous *O. viridulus.*
          (ii.) Partly ruddy; palpi white at tip .. .. *O. rufipes.*
        (b) Shorter mediastinal area, dilated at base
          (i.) Lateral ridges of pronotum sharply angled .. .. *S. bicolor.*
          (ii.) Lateral ridges nearly straight
            (*a*) Elytra and wings developed .. .. *C. elegans.*
            (*β*) Wings aborted in male and female; elytra aborted in female .. *C. parallelus.*
    (ii.) Antennæ clubbed.
      1. Colour somewhat uniform brown; mediastinal area dilated at base; clubs pronounced, whitish at tip .. .. *G. rufus.*
      2. Smaller; spotted and varying; mediastinal area undilated; clubs less pronounced, concolorous .. .. *G. maculatus.*
B. Pronotum covering abdomen; pad between tarsal claws; species very small.
  (*a*) Stout; pronotum extending to hind knees; ridge elevated; sometimes two black spots.. .. .. *T. bipunctatus.*
  (*b*) More slender; pronotum extending well beyond hind knees; ridge less pronounced .. .. *T. subulatus.*

Mecostethus grossus.—First on the list of British Acridians, as well as first in size and richness of colouring, comes the large Bog Grasshopper, *Mecostethus grossus*, Linn. It is the sole species of the genus and in suitable places is to some extent common over the northern part of Europe as far as Lapland.

In Britain some twenty years since it was considered to be one of the rarest of the grasshoppers. Eland Shaw in 1889 knew of but two modern records—one specimen from the Norfolk Fens, and one from County Kerry. There are, however, several earlier records (*vide* "Entomologist," 1899, p. 169). In 1892 a male was taken at Irstead in Norfolk. In 1895 the species occurred in abundance in the West of Ireland, and the same year Mr. B. G. Rye found it in some numbers in Norfolk. Next year Mr. W. Jeffreys took several in the New Forest in the neighbourhood of Lyndhurst, and from 1898 onwards I have found it present, and often common, in every bog that I have examined in the New Forest. Besides the New Forest and various places in Norfolk, the only other localities for the species at present known are in Galway and Kerry.

No doubt *M. grossus* was so long overlooked because it has a liking for the wetter parts of the bogs, and matches so well with the bog-vegetation that it is almost impossible to distinguish it unless it takes to the wing. This it does when disturbed, provided that the sun is shining. Its flight is very heavy and not sustained for more than ten or twelve yards. In September 1906, I saw a Robber Fly (*Asilus crabroniformis*) carrying a male which was of about the same size as itself and probably heavier; so apparently the grasshopper was not so well hidden that its enemy could not find it.

In general colouring *M. grossus* is bright green tinged in places with brown, and marked with black, ventrally the thorax is paler green and the abdomen yellowish. The hind femora are carmine beneath and the hind tibiæ are yellow with black bands and spines. Size and colouring forbid confusion with any other British species. It may easily be kept in captivity, if its habits are not forgotten; it feeds on grass. (The female is figured, with wings both spread and closed, in "Entomologist" 1899. Pl. 2.)

Stenobothrus lineatus, Panz.—Judging from the small number of individuals of this species submitted to me for inspection, and from the fact that I have seldom taken it myself, I am forced to conclude that this is not one of the common grasshoppers in Britain. It should not, however, be set down as a rarity, for no doubt but few have sought for it.

S. lineatus is of fair size and bulky in appearance. It may be distinguished by:—(i.) the rosy margin of the pronotum, from which apparently it obtains its specific name; (ii.) the regular reticulations in the discoidal area; (iii.) the presence of an external tooth at the base of each lower valve of the ovipositor; (iv.) a white crescent on the elytra.

Though Panzer in his original description in 1796 says:—"*Habitat in Germania campis arenosis*," it would appear to prefer hill or cliff sides in Britain. Except in the extreme north, this grasshopper is distributed well over Europe; but in Britain it has been recorded only from the southern part of England. The following are all the localities I am able to quote:—*Kent:* Folkestone (Briggs), Dover (Porritt), Charing (Chitty), Stonehall and Sibertswold (Burr). *Sussex:* Selsea, Cocking Down, and Goodwood (Guermonprez). *Surrey:* Redhill (Bloomfield), Merrow Downs (Lucas), Boxhill (South), Leatherhead (Burr). *Berks:* reported from near Radley College. *Hants:* Bournemouth (Winston). *Dorset:* Studland, and between Lulworth and Weymouth (Lucas).

Devon: Wembury Cliffs (Bignell), Braunton Burrows (Parfitt). *Norfolk:* Docking Common (Shaw). *Gloucester:* Colesbourne (Edwards).

Omocestus viridulus, Linn.—In this species we have one of the commonest of our Acridian grasshoppers occurring—and it would seem freely—in all four parts of the British Isles, including the Isle of Man. It is also widely distributed over northern and central Europe, and is found in northern Asia. Few grasshoppers in this country are mature before midsummer. This one seems to be a fairly early species, but I have not noted it before June 26th. The female is of fair size and somewhat bulky build, but less heavy-looking than the last species. Usually the general dark green colour will indicate *O. viridulus*, and, though the colouring may vary somewhat, this species will seldom be confused with anything except the next, *O. rufipes*, from which it may be distinguished by the unicolorous palpi. A form occurs of a rosy tint. In captivity *O. viridulus* may be fed on fresh grass. Near Winkton Post, in the New Forest, on August 22nd, 1902, I took a specimen of the Robber-fly (*A. crabroniformis*) which had captured a male of this species. Both captor and prey were given to Professor Poulton for his series of insects and their prey.

Omocestus rufipes, Zett.—This species is found all over Europe. In this country, though perhaps not rare, it cannot be described as common. Personally, I have taken it only in the New Forest, where it occurs in a number of spots, but perhaps prefers rides in oak and similar woods. Other localities that have been given are: *Kent:* Deal (Briggs), Herne Bay (Waterhouse), Guestling (Bloomfield), Bromley (Shaw). *Surrey:* Leith Hill (Briggs). *Sussex:* Abbott's Wood (Porritt). *Gloucester:* Wotten (Shaw). *Dorset:* Glanvilles Wootten (*teste* Burr). *Devon:* Coast (Bignell), Lynton (Briggs). *Cornwall:* Newquay and Land's End (Burr). *North Wales:* Penmaenmawr (Porritt). *Suffolk:* Broad (Morley). *Cambridge:* Wicken (Porritt). *York:* Thorne Moor, Sandburn, Castle Howard (Porritt). *Lake District* (Porritt). Rannoch, in Scotland, has been given as a locality, but the report seems to need confirmation.

From its congener, *O. viridulus*, it may be readily known by the conspicuous white tip to the palpi, and the ruddy abdomen. It is also somewhat smaller in size and usually darker in colour. I have kept the species alive for some time in captivity, feeding it on grass.

Stauroderus bicolor, Charp.—In this species we have one of the commonest of British Orthoptera, and it is equally common throughout Europe. It would therefore be superfluous, as well as tedious, to give the very numerous localities that have been recorded for it, though I doubt if even yet every English county would appear upon the list. There are also a number of Scotch, Irish and Welsh records as well as some from the Isle of Man. *S. bicolor* is essentially the field grasshopper, preferring dry open spots especially near the coast, and not frequenting woods or similar places. The accuracy with which its colouring often assimilates to that of its surroundings is very remarkable and as a consequence there are many colour variations. A very beautiful rosy form has been given the varietal name *purpurascens*, Fieb., a greenish one *mollis*, Charp., and a dark one *nigrina*, Fieb. The short but dilated mediastinal area, coupled with the much angled lateral ridges of the pronotum and the unclubbed antennæ, should allow of this species being distinguished without much difficulty. *S. bicolor* has often been confused with a closely related species *S. biguttulus*, which lives in woods, but is at present not known as British. In Surrey, I have taken *S. bicolor* in November.

Chorthippus elegans, Charp.—We now come to two species, not much alike in many respects, but agreeing in the possession of nearly straight lateral ridges to the pronotum, and in this respect differing from all the other British representatives of the Acridiodea. These are *C. elegans* and its congener *C. parallelus*. On the Continent *C. elegans* is widely distributed, though apparently it cannot be called a common insect, and much the same must be said of it in England. Records for this country are not very numerous, though too many for me to give them *seriatim*. None occur farther north than Lincolnshire. There is but one for Wales—Penmaenmawr (Porritt)—and none for either Scotland or Ireland.

From personal acquaintance with the species in the New Forest. I should say that its home is usually some damp grassy spot, and as a matter of fact it is often reported from marshy localities; but it also occurs on sandhills as at Deal and Sandwich. I have found it to be somewhat sluggish in its movements. In grassy spots in the New Forest the dorsal colouring was often greenish (though sometimes brown) harmonizing with the grass; but Mr. Hamm found it brown in colour on the Deal sandhills, harmonising with the colour of the soil.

C. parallelus being the only other British species with parallel ridges to the pronotum, it is necessary only to find for *C. elegans* sufficient points of distinction from that species. The comparatively small males look very much alike, but in *C. elegans* the wings are fully developed, while in *C. parallelus* they are aborted. In the former species the females have fully developed elytra and wings, while in the latter both are very much aborted.

Chorthippus parallelus, Zett., disputes with *S. bicolor* the possession of the title of the commonest of British grasshoppers. I have records extending from the north of Sutherland in Scotland, to the Lizard in Cornwall, and Folkestone in Kent; but while I have a number for Scotland and several for Wales, there are none whatever for Ireland. The species seems to be equally common throughout Europe. In my experience it has a liking for meadows and open places, especially where the ground is wet or, at any rate, damp. There is great variation in colouring, especially in the females, there being often a striking similarity to that of the environment—a feature which should be of much advantage to an insect whose movements are restricted in consequence of its aborted alar organs. I have met with it in Surrey as late as October 12th.

Gomphocerus rufus, Linn.—Again we have two congeneric species, *G. rufus* and *G. maculatus*, which, though bearing some resemblance one to the other, are readily distinguished from all the rest of the British Acridiodea by the possession of clubbed antennæ. Burr considers *G. rufus* "common in north and central Europe," but it does not appear to be so in England, where I have only a few records for the south. They are:—*Kent:* Folkestone Warren (Burr); Maidstone (Shaw). *Surrey:* Compton (F. W. Edwards); Boxhill (Briggs); Leatherhead (Burr); Battersea Fields, taken in the nineteenth century by Samouelle (Dale); Redhill (Frisby); Bookham Common (Lucas). *Sussex:* Linchdown and Goodwood (Guermonprez). *Hants:* Lyndhurst (Dale). *Berks:* (Hamm). *Gloucester:* Colesbourne (J. Edwards). *Devon:* Wembury and Bolthead (Bignell); sandhills at Exmouth and Dawlish (Parfitt). I have no records at all for Scotland, Ireland, or Wales.

My sole experience of the species—on the dry warm bank of a certain pond on Bookham Common—does not enable me to speak generally of its habitat in this country. Points of distinction from the other species, *G. maculatus*, are (i.) the rather larger size, (ii.) the uniform reddish-brown colour, (iii.) the pronounced clubs to the antennæ, especially in the male, which has them tipped with white.

Gomphocerus maculatus, Thunb., is a common species in northern and central Europe, including Great Britain. I have a good number of records for England and Scotland, as well as some for Ireland, Wales, and the Isle of Man. It seems to be most at home on heaths and other dry places. *G. maculatus* is very variable in colouring, and usually assimilates remarkably well with its surroundings—almost black examples, for instance, being found on a recently burnt heath. In Surrey it is usually mature towards the end of June. Distinguishing points are: (i.) the small size, (ii.) the spotted appearance, (iii.) the antennæ without white tip. In the female the clubbing of the antennæ is not very evident on a superficial examination.

Tetrix bipunctatus, Linn.—To conclude with, we have two very small grasshoppers with inordinate extension backwards of the pronotum, though in the British species this is nothing compared with the size and extraordinary shape assumed by some exotic species. *T. bipunctatus* is distributed all over northern and central Europe, and is very common in Great Britain. I have many records for England and Scotland, and some for Ireland, Wales, and the Isle of Man. It is a very variable species, not easily discovered when at rest. Eland Shaw gives "dry places in woods, fields, and under dead leaves" as its haunt, but I fancy it is not averse to damp spots also. The most striking point in its economy is the fact that it hibernates as an imago and reappears early in the spring or even on warm bright days in the winter. Its sturdy build, and pronotum reaching to, but scarcely beyond, the hind knees, distinguish it from the much scarcer *T. subulatus*. The two black spots on the pronotum, from which it derives its specific name, are not at all constant. (Figured in "Entom.," Vol. xxxiv., Pl. III.)

Tetrix subulatus, Linn.—In Europe this species appears to have a more southerly distribution than the last. In England I have a few records for the southern half of the country, and there is a somewhat doubtful one for Ireland. I have seen specimens from the New Forest and Milton in Hants (Lucas); near Studland in Dorset (Yerbury); and Padstow (Lamb) and Wildermouth Bay (Bracken) in Cornwall. Other localities are East Grinstead and Dormans in Sussex (Burr); Charmouth in Dorset (Shaw); Bickleigh Woods in Devon (Bignell's Coll.); Burwell, Wicken, and Tuddenham Fens (Morley). A few other records seem to me to need confirmation. Apparently this species likes damp spots and may-be has a preference for the neighbourhood of the sea. Whether it hibernates or not seems not to be known; presumably it does. It may be known from *T. bipunctatus* by (i.) its more slender build, (ii.) the pronotum extending much beyond the hind knees. (Figured in "Entom." Vols. x., xxiv., Pl. III. and xliii., p. 327).

Several casuals have occurred from time to time:—

Gomphocerus sibiricus, Linn., once near Netley.
Pachytylus migratorius, Linn., possibly.
P. danicus, Linn. (=*cinerascens*), occasionally.
Œdipoda cærulescens, Linn., once or twice.
Acridium ægyptium, Linn., occasionally, imported with vegetables.
Schistocerca peregrina, Oliv., occasionally.

P. migratorius, *P. danicus*, and *S. peregrina* are migratory locusts, and flights may occasionally extend as far as Britain, as one of the last-named did in 1869. *P. danicus* is, however, most likely to come, and may occasionally breed here. It is quite possible that *P. migratorius* should always be *P. danicus*, the identification having been at fault.

EXPLANATION OF PLATE III.

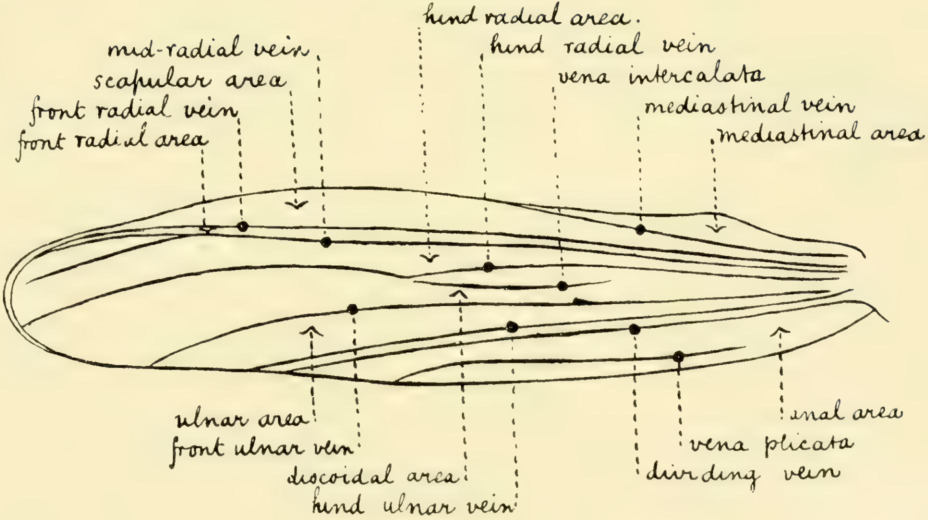
1. *Omocestus viridulus*, Linn., ♀.
2. *Stenobothrus lineatus*, Panz., ♀.
3. *Mecostethus grossus*, Linn., ♂.
4. *Omocestus rufipes*, Zett., ♀.
5. *Stauroderus bicolor*, Charp., ♀.

EXPLANATION OF PLATE IV.

6. *Chorthippus elegans*, Charp., ♂, ♀.
7. *Chorthippus parallelus*, Zett., ♂, ♀.
8. *Gomphocerus rufus*, Linn., ♂.
9. *Gomphocerus maculatus*, Thunb., ♂.
10. *Tetrix bipunctatus*, Linn.
11. *Tetrix subulatus*, Linn.

All × $\frac{4}{3}$.

PLATE II.



W.J Lucas del.

Forewing (tegmen) of an Acridian Grasshopper, showing veins and areas.

Proc. S.L.E. & N.H. Soc.

PLATE III.

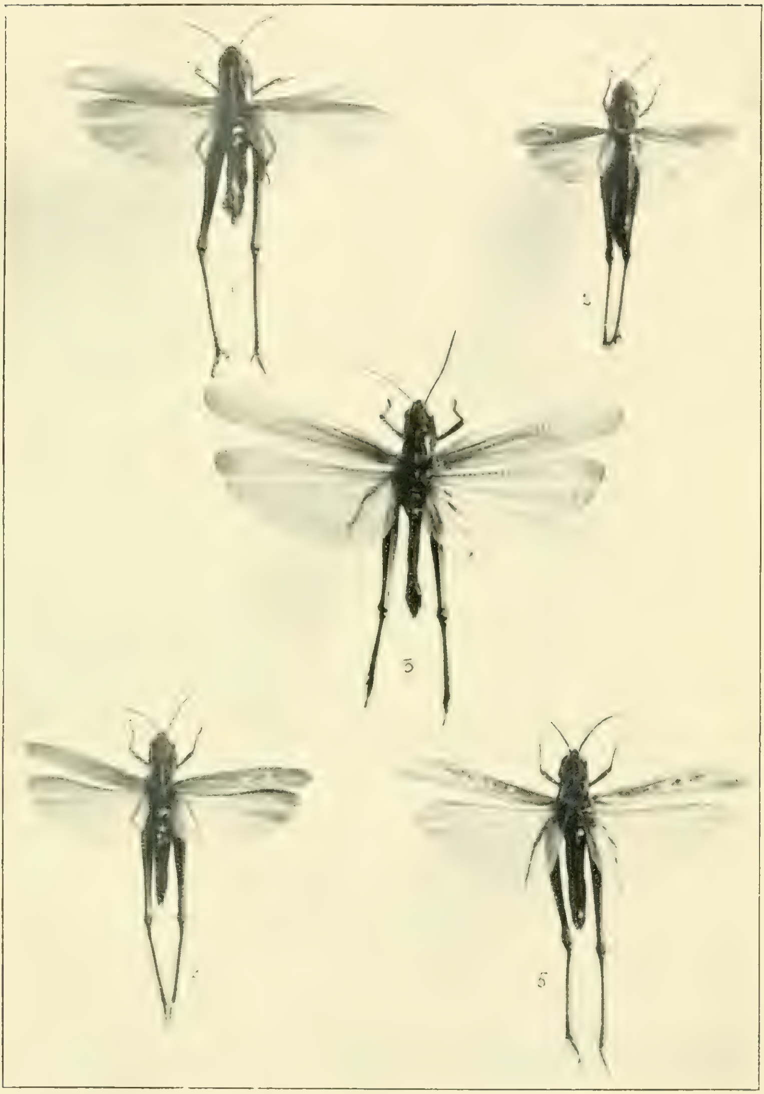


Photo by W. J. Lucas.

British Short-horned Grasshoppers.

PLATE IV.

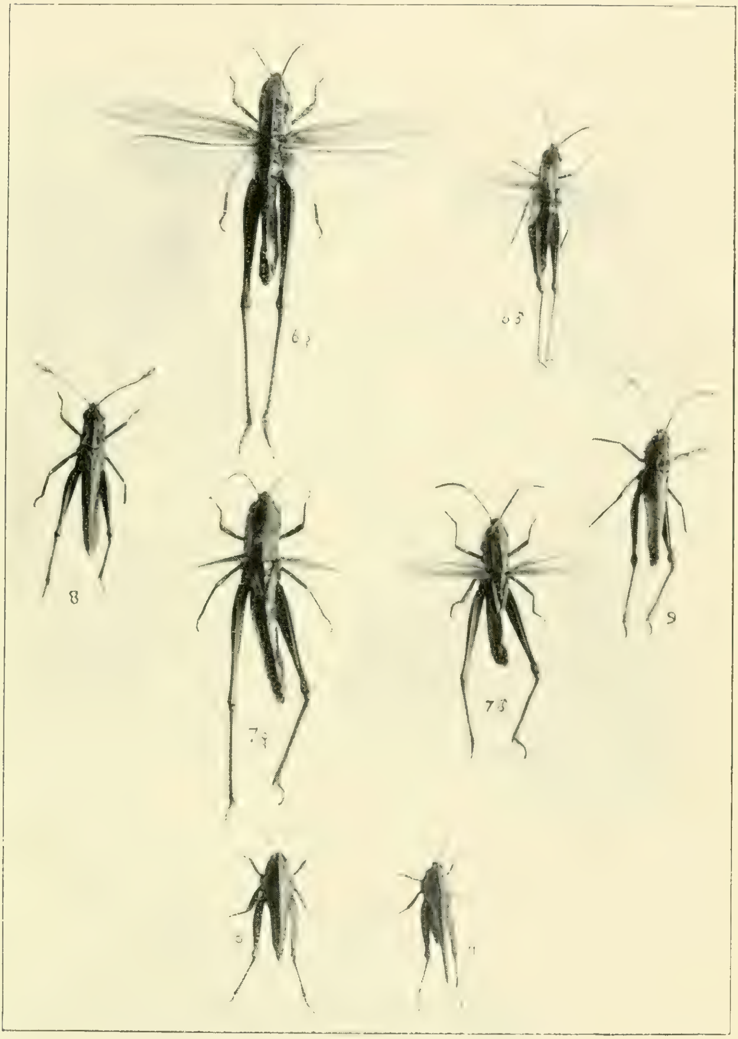


Photo by W. J. Lucas.

British Short-horned Grasshoppers.

Mimicry in the North American Butterflies of the Genus Limenitis.

By Prof. E. B. Poulton, F.R.S., F.L.S. *Read October 23rd*, 1913.

(The paper of which an abstract is given below was illustrated by numerous lantern slides.)

The models *Danaida plexippus* (*archippus*), *D. berenice* and *D. strigosa* belong to the old world Danaines, and are to be regarded as modern invaders of the American Continent. *D. plexippus* probably came in by way of the north, and it even now ranges far into Canada. It is to be looked upon as the American equivalent of the old world *D. genutia* (*plexippus*) which may probably have extended north along the eastern Asiatic coast, and crossed at Behring Strait during some temporary amelioration of climate. That it invaded America by way of the north is well shown by the fact that it has produced an excellent mimic in temperate North America only. It ranges with slightly varying pattern through tropical America to the temperate south, but nowhere has it produced an undoubted mimic except in the north.[1] The other two Danaine forms, *D. berenice* and *D. strigosa*, are the New World representatives of *D. chrysippus*. These are less suited to a cold climate, and are only found in the southern States. They also may have invaded America by way of the north—although considerable amelioration would here be required—or it is possible that they were accidental immigrants across the Pacific. They are probably not distinct species, but geographical races the one of the other, and, like *plexippus*, extend southward through tropical America with slight changes of pattern. They also resemble *plexippus* in the fact that they have undoubted mimics in North America only.

The Nymphaline *Limenitis*, or as its North American forms are called *Basilarchia*, is a characteristic circumpolar group, of which the majority of forms in both the Old World and the New, possess the well-known pattern made up of broad white markings upon a black background. A good example is our English *sibylla*, and the European *camilla*, and a very similar pattern is found in the North American *arthemis* and *weidermeyeri*, as also in *lorquini*, although here the pale part of the pattern is cream coloured.

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[1] It is possible that there is an incipient mimic among the South American *Acræinæ* of the genus *Actinote*.

According to the theory of mimicry as due to the influence of environment, we should expect that the Old World invaders when they entered North America, would have acquired a North American pattern. We find, however, that they retain the characteristic appearance of an Old World group of Danaines, and that they impress this pattern upon the ancient North American genus *Limenitis*, producing admirable mimics. The facts are, therefore, the reverse of what we should expect on the theory of mimicry as a direct result of geographical conditions.

If the mimetic pattern of *Limenitis archippus* be compared with that of the ancestral forms of the genus, it will be seen that those parts of the old markings that were available for the purpose, have been retained and worked up into the mimetic resemblance, while other parts that would interfere have been removed. A single element in the old pattern which interferes with the resemblance has been retained, namely, the black line crossing both the upper and lower surfaces of the hindwing. This line is clearly the black outer border of the old white band of the genus, and traces of white may still be found clinging to its inner border on the under surface of many specimens. It is extremely interesting to find that in the Hudson River district the black line has disappeared from the upper surface of the hindwing in a large proportion of the males, while others show a transition.

In Florida the model *D. plexippus* exists side by side with *D. berenice*, but the latter is far commoner, and influences *L. archippus* more strongly, so that the mimic here gains the rich chestnut-brown colour of *berenice*, and is known as the local form *floridensis* (*eros*). There can be little doubt that *floridensis* is merely a geographical race of *archippus*, and it would be extremely interesting to ascertain whether the two combine to form an interbreeding community along the line of their overlap. That *floridensis* has been produced by the transformation of *archippus* is proved by the fact that the old *archippus* pattern, with its heavily marked veins, can still be detected beneath the rich deep ground-colour, although it tends to interfere with the resemblance to the new model *berenice*. The blackened veins of the upper surface are to be looked upon as a persistent vestige of an older mimetic resemblance.

In Arizona we meet with the still more interesting mimic *Limenitis hulsti*, or *obsoleta*, resembling the local Danaine, *D. strigosa*. I have recently had an opportunity for studying a long series of this mimic, and find that its pattern is certainly more ancestral than that of *archippus* and *floridensis*. It retains persistent vestiges of the old white band on both surfaces of the hindwing, and more evident traces of the same feature are retained by the forewing than in the other two forms. The most interesting vestige is a short white stripe which represents the inner marginal termination of the old white band on the upper surface of the forewing.

Mr. H. Eltringham has kindly made preparations of the male armature of these three forms of *Limenitis*, together with those of the ancestral North American species of the genus; and the comparison of these organs entirely supports the conclusions drawn from a study of the patterns. The form of armature in *archippus* resembles that of *floridensis*, while the armature of *hulsti* is transitional between these two and the ancestral forms *arthemis* and *weidermeyeri*. A full account of the relationship between these North American species of *Limenitis* has been recently communicated to the Academy of Natural Sciences of Philadelphia, and it is hoped that reproductions of Mr. Eltringham's drawings will appear in the publications of the Society.

With regard to *L. lorquini*, it is probable that mimicry has proceeded in another direction, and that the cream colour of the pale markings and the bright fulvous tip of the forewing have been produced in mimicry of *Adelpha* (*Heterochroa*) *californica*, the single northern representative of a large tropical American group. That the bright fulvous tip has been produced by mimicry, is supported by the fact that it tends to decrease in British Columbia and Vancouver's Island, well to the north of the geographical range of the model, as shown in Plate XXV. of "Trans. Ent. Soc.," London, 1908.

The Ithomiinæ.

By W. J. Kaye, F.E.S. *Read December* 11*th*, 1913.

The *Ithomiinæ* are a sub-family of the *Danaidæ* that exclusively inhabit tropical and sub-tropical America. Although they have the contour and flight like some Heliconines and Acræines they are sharply differentiated. Bates in his famous paper, *Contributions to an Insect Fauna of the Amazon Valley*, published by the Linnean Society in 1862, confused the relationship of this sub-family by treating it as a sub-family of the *Heliconidæ*. He there called them the Danaoid *Heliconidæ*, while his Acræoid *Heliconidæ* included the genera *Heliconius* and *Eueides*. In a footnote, however, he refers to Felder's then recent paper in the "Wiener Entomologische Monatschrift" for March, 1862, where the two genera *Heliconius* and *Eueides* are separated entirely from the Danaoid *Heliconidæ* and placed by themselves in a separate family, the *Heliconidæ*, thus leaving the Danaoid *Heliconidæ* to embrace what we now know as the *Ithomiinæ*. They were still connected to the *Heliconidæ*, with which they have no relation except in colouring. By reversing Bates' term Danaoid *Heliconidæ* and calling them Heliconoid *Danaidæ*, we get a most appropriate term, for these butterflies at first glance do not have any resemblance to true Danaids. Many authors have treated the Danaoids, including the Ithomiines, as sub-families of the *Nymphalidæ*, but while they are certainly related, they are doubtless far enough removed to be treated along with the Danaines and Lycoreines as a separate family.

Some authors have raised the *Ithomiinæ* to family rank and termed them *Neotropidæ*, but they have so many affinities with the true Danaids that one is not warranted in so separating them. All Danaids, including the three sub-families *Danainæ*, *Lycoreinæ*, *Ithomiinæ*, have the sub-median vein of the forewing bifurcated at the base, while all Nymphalids have the sub-median vein, or vein 1, simple, except in the aberrant genus *Colænis*, when both the median and sub-median veins are bifurcated at the base. The Danaids are, however, linked with the Nymphalids by the imagines having the front pair of legs aborted and useless for walking. The aberration is very great in the males, but less so in the females, as is found also in the *Erycinidæ*. Having placed them with the *Danaidæ*, one may diagnose the *Ithomiinæ* as follows:—

Wings usually long and narrow, antennæ long and thin, with a long slender club not scaled. Abdomen long and slender, projecting beyond the margin of the hindwing. All the males have one or more pencils of hair (scent brushes ?) on the costa of the hindwing, which is hidden in the overlapping of the forewing. The sexes are nearly always neurationally different in the hindwing, often markedly so.

The larvæ are mostly cylindrical, with short tubercles, in some genera with long appendages on segment 2, as is found in *Hirsutis*. Their foodplants are usually, if not invariably, what are deadly poisons to man. The *Apocynaceæ* and *Solanaceæ* contain chiefly the very few known pabula.

According to Guppy, who has reared several of the species of *Ithomiinæ* to be found in the Island of Trinidad, the eggs are laid singly in the cases of *Hirsutis* (=*Tithorea*) *megara* and *Heterosais* (=*Hypoleria ocalea*), but in batches of from twelve to twenty-five in the case of *Mechanitis veritabilis*. They are described as conical or spindle-shaped and ribbed longitudinally in the two latter, but having cell-like depressions in the former, which are well defined for a third of the height down. They are laid on either the upper or the under surface of the leaf. Mr. Guppy speaks of the larvæ as always sluggish, but in appearance they can be very dissimilar. Thus *Tithorea megara*, of which he gives a figure in the appendix to my Trinidad Catalogue in the "Trans. Ent. Soc.," 1904, Pl. xviii., fig. 3-3a, 36, is "black and white, even almost black, but occasionally lilac tinted and less opaque looking": whilst *Hypoleria ocalea* is semi-transparent like *Mechanitis veritabilis* when newly hatched, changing later to a transparent bottle green with a greenish white head. When mature sometimes more or less translucent greenish, paler or clearer, but without any definite markings save a dorsal stripe caused by the food showing through the skin. It will thus be seen that while some larvæ are opaque and ornamented with black and white markings, as in *Tithorea megara*, others are translucent and shew the contents of the larva's body. Such a variation in the larvæ within the limits of one sub-family is remarkable and I know of no comparable instance, certainly not amongst the butterflies. Transparent skinned larvæ one usually connects with an internal feeding habit, or at least a concealed feeding habit, such as between two spun leaves or in a curled up leaf; yet Mr. Guppy says nothing about such a habit, and in fact speaks of *Hypoleria ocalea* as feeding from the underside of the leaf, where it remains coiled round with its head touching its body.

"The pupæ in contrast to the long, thin bodies of the butterflies are mostly short and stout. They have often brilliantly shining metallic glossy surfaces, the gloss of which, however, fades after the death of the pupa."—(Hænsch).

It will be noted that, both by the larval and pupal characters, there is strong affinity with the Danaids. Whether the poisonous nature of the foodplants has any effect as to the palatability of the imagines I do not know; but the imagines are always regarded as nauseous species and, to a large extent, protected by their unpalatableness. Certain it is that they are often excessively abundant, and we know that some species—such as *Hypoleria ocalea* (vide "Trans. Ent. Soc.," 1904, p. 226)—can complete their metamorphoses in three weeks or less, and that the total larval period may last no longer than nine days. They are continuously brooded in all warm districts, such as in British Guiana and in Trinidad at sea level; but whether they are so at elevations of 3,000ft. or more in S. Brazil, where the temperature drops to freezing point at night in the winter or dry season, I am unable to say. The geographical distribution of the *Ithomiinæ* is roughly the tropical and subtropical countries of South and Central America. Three species, *Dircenna klugii*, *Ceratinia lycaste* and *Mechanitis californica*, just reach up to the southern border of the United States, but only rarely; while to the South, in the Argentine, very few species are to be found, and only in the North of the Republic. Vertically, some species mount up to close on 10,000ft., such as *Ithomia epona* in Ecuador, while others are found in the hottest fluvial valleys on the equator. At an elevation of about 3,000ft. probably more species are to be found than at any other. Near Caracas, in Venezuela, at this elevation, I found Ithomiines swarming; hundreds of individuals in the aggregate, divided amongst some twelve species. Dr. Longstaff, who visited the same locality eight years subsequently, found all but three of the species I had taken besides five others, making fourteen species in a small area some 50 yds. by 10 yds. In the "Entomologist's Monthly Magazine," Vol. xix., p. 76, 1908, he gives a list of the species he took. To these I can add *Heterosais giulia*, *Pteronymia starkei* and *Episcada sylpha*, thus making no fewer than seventeen species, divided amongst eleven genera for this small restricted area. To prevent confusion, it should be said that *Ithomia cymothoë* and *Ithomia sylvella* are now placed in the genus *Miraleria*, and not in *Ithomia* as recorded by Dr. Longstaff. The eastern slopes of the Andes in Columbia, Peru and Ecuador, also furnish a great abundance of species, and each locality or district generally favours a particular type of coloration. This is always so in the case of the genera *Melinæa* and *Mechanitis*, and nearly always so with *Ceratinia* and *Napeogenes*, together with many other species of different genera which mimic them. With the genera *Dircenna*, *Epithomia*, *Ithomia*, *Calloleria*, *Hyposcada*, *Leucothyris*, *Episcada*, *Pteronymia*, *Miraleria*, *Aeria*, *Velamysta*, *Hypoleria*, *Pseudoscada*, *Dismenitis* and *Heterosais*, which include species which are for the most part transparent, there is also a scheme of colouring running through different geographical groups of species, but the colouring is not always confined to one district or area such as is the case with *Melinæa* and *Mechanitis*, and the various species that mimic them. Thus, a black and transparent group is to be found in Costa Rica, in E. Peru, in the Guianas, in S. Brazil, and in almost any suitable locality where

Ithomiines occur, but such a type as is exemplified in *Melinæa cydippe*, black with a large orange band, is only to be found in E. Peru and the adjacent parts of Bolivia. Similarly the chestnut coloured type, such as is to be found in *Melinæa pardalis*, is confined to the middle Amazonian area. Although the smaller transparent Ithomiine genera do not so readily form distinctive colour groups yet several are well enough defined, and at the same time restricted in their distribution. *Hypoleria chrysodonia*, *Leucothyris ida* and *Pseudoscada aureola*, all of which are transparent with an orange-brown apical band, are only to be found about the upper Amazon near Pebas and Iquitos in Peru. Similarly, *Pteronymia hemixantha*, *Pteronymia euritea*, *Heteroscada gazoria*, *Napeogenes xanthone*, a group with both fore- and hindwings dusted heavily with sulphur yellow, is only to be found in S. Brazil, where it is quite independent of the type of colouring set by *Melinæa ethra*. In some cases, these transparent groups of species are offshoots of the larger and more conspicuous associations which centre around the large and often very abundant species of *Melinæa* and *Mechanitis*. The transparent group with the orange-brown band, is undoubtedly a sub-group of the wonderful assemblage of similarly coloured species which are to be found with *Melinæa cydippe* in Peru, such as *Mechanitis methone*, *Ceratinia semifulva*, *Ceratinia bicolora*, *Heliconius aristiona*, besides another dozen or more species belonging to the *Papilioninæ*, *Satyrinæ*, *Nymphalinæ*, and the day flying family of the *Heterocera*, *Hypsidæ*. While in British Guiana the small semi-transparent group of *Ithomiinæ* composed of *Ceratinia vallonia*, *Napeogenes inachia*, *Napeogenes cyrianassa* and *Calloleria cablyana*, are undoubtedly influenced in their colouring by the large main group of conspicuous Ithomiines with *Melinæa mneme* as the centre. But that there are other groups which are independent of the "*Lycorea* habitus" as Haensch speaks of the larger *Lycorea*, *Melinæa* groups, is undoubted, as I have already instanced. A further very good case is to be found in the high mountain group of beautiful Ithomiines in eastern Ecuador, which includes the species *Dismenitis theudelinda*, *Velamysta crucifera* and *Ithomia epona*, which all show a conspicuous marginal band of white spots with transparent wings. The altitude at which these occur is far greater than that ever attained by a *Melinæa* or *Mechanitis*, being about 7,000ft. to 10,000ft. against a probable maximum of 3,000ft. for *Melinæa*, and this is much above the elevation at which they usually occur. Such species as I have met with, viz., *M. mneme*, *M. crameri*, *M. egina* in Guiana, and *M. tachypetis* in Trinidad, have been found at very little above sea level, where they haunt the heavy primeval forests. But such species as *Melinæa messatis* and *M. ida* in Colombia, and *M. lilis* in Venezuela, occur higher. The latter I have received from Caracas, which is 3,000ft., but whether the species was taken there or lower down I am unable to say.

The distribution of the different genera of the *Ithomiinæ* is curious and interesting. Some, such as *Melinæa*, *Mechanitis*, *Ceratinia*, *Leucothyris*, *Episcada*, *Napeogenes* and *Dircenna*, are distributed over the whole of the area covered by the family, while others are chiefly northern, such as *Callolina* and *Aeria*. The genera *Heterosais*, *Ithomia*, *Miralera* are chiefly in the north-western part of South America, while *Hymenitis* is chiefly in the south-west. *Heteroscada* has but a sole representative, found only in the south-east, while the eastern slopes of the Andes in Peru and Ecuador produce most of the forms of *Valamysta*, *Hypoleria*, *Dismenitis* and *Pteronymia*. Some of the genera have a marked pattern by which their location may be suspected, but others contain species with patterns of all the rest of the genera, such as are to be found in *Napeogenes*, a genus that is, perhaps, one of the most interesting in all South America. All the species it contains are like other species in other genera of *Ithomiinæ*; there is no definite shape even, some species are long-winged, some short-winged, some narrow and some broad. Except that the genus is one of a distasteful family, it is very comparable to the Nymphaline mimetic genus *Eresia*. In nearly all the transparent Ithomiine genera there are odd species which seem to be out of place by their coloration. Thus, in *Ceratinia* there is the curious looking *C. eupompe*, besides the dark *C. cano*, *C. frater* and *C. statilla*. In the genus *Leucothyris*, which has such a usually well-marked pattern and coloration, there are the aberrant-looking species *L. zelica* and *L. pagasa*, besides the group with the orange-brown marks on the apex, such as *C. ilerda* and *C. ilerdina*, etc. In *Calloleria* there are no species that seem to be out of place by their coloration, but in *Ithomia* there are a variety of forms and colourings, and it is much more of a mimetic genus like *Napeogenes* than most of the others. The genus *Hyposcada*, although close in structure to *Leucothyris*, a particularly transparent genus, contains no transparent species, and most of them fall in as members of the large *Melinæa* and *Mechanitis* groups, rather than into true Ithomiine groups. Some of the species are rare, especially so for Ithomiids, such as *H. fallax*, which flies in Peru in company with *Melinæa cydippe* and *Mechanitis methone* of which it is a very complete copy on a small scale. In *Ceratinia* there are also two similarly coloured species in *C. semifulva* and *C. honesta* ab. *bicolora*, which are also rare. The species that come closest in coloration to the species of *Hyposcada* are to be found in *Ceratinia*, but such species as *H. consobrina* and *H. similia*, are not like any other Ithomiids that I know of, notwithstanding the name of the latter, which may have an allusion to some other species. There are hardly any species of Ithomiines that are not roughly, but very often most exactly, copied by Ithomiine species of other genera. Thus we have, going seriatim through all the genera, the following colour resemblances:—

Some species of	Resemble	Some species of
Olyras	,,	*Dircenna, Athesis.*
Eutresis	,,	*Thyridia, Aprotopos.*
Athesis	,,	*Dircenna, Olyras.*
Thyridia	,,	*Aprotopos, Eutresis.*
Tithorea	,,	*Heliconius* (no Ithomiine genera).
Hirsutis	,,	*Melinæa, Mechanitis, Athyrtis.*
Melinæa	,,	*Mechanitis, Hirsutis, Athyrtis, Ceratinia, Hyposcada, Napeogenes.*
Mechanitis	,,	*Melinæa,* do. do. do.
Aprotopos	,,	*Thyridia, Eutresis.*
Callithomia	,,	*Ceratinia, Mechanitis, Hirsutis, Hyposcada.*
Ceratinia	,,	*Melinæa, Mechanitis, Hirsutis, Hyposcada, Napeogenes, Sais, Callithomia, Ithomia.*
Heteroscada	,,	*Napeogenes.*
Napeogenes	,,	*Ceratinia, Hyposcada, Callithomia, Ithomia, Hypoleria, Heteroscada, Pteronymia, Episcada, Velamysta, Dismenitis.*
Sais	,,	*Ceratinia.*
Scada	,,	*Aeria.*
Dircenna	,,	*Olyras, Ceratinia, Napeogenes, Thyridia, Aprotopos.*
Epithomia	,,	*Callithomia, Ithomia, Calloleria.*
Ithomia	,,	*Ceratinia, Napeogenes, Pteronymia, Episcada, Hypoleria, Pseudoscada.*
Calloleria	,,	*Epithomia, Ceratinia.*
Hyposcada	,,	*Ceratinia, Melinæa.*
Leucothyris	,,	*Ithomia, Hypolina, Pteronymia, Dismenitis, Velamysta.*
Episcada	,,	*Pteronymia.*
Pteronymia	,,	*Episcada.*
Miraleria	,,	*Pteronymia.*
Aeria	,,	*Scada.*
Velamysta	,,	*Leucothyris, Dismenitis.*
Hypoleria	,,	*Pseudoscada, Napeogenes, Leucothyris.*
Pseudoscada	,,	*Hypoleria, Pteronymia, Napeogenes.*
Dismenitis	,,	*Hymenitis, Velamysta.*
Hymenitis	,,	*Velamysta, Dismenitis. Leucothyris, Pteronymia.*
Heterosais	,,	*Episcada, Pteronymia.*

This remarkable recurrence of pattern and colouring is probably to be explained in two ways. Those species which are very transparent, with little or no markings, are most inconspicuous amongst the shadows of the forest, and a common pattern is probably to be explained by the necessity for common concealment. It is hardly likely that a single type, such as black and transparent, with a bluish coloured wing membrane, would occur over the greater part of tropical America, and at a variety of elevations, if there was not some common object to be attained. The other explanation which would hold for the variously coloured groups is that there is mimicry between them, the mimics being Müllerian in their action. Some of the transparent Ithomiines, such as *Thyridia* (*Methona*) *themisto* and *Dircenna dero* are very conspicuous sitting in company with the Danaid *Ituna ilione* in S. Brazil on flowers of *Eupatorium*. In the "Proceedings of the Entomological Society," 1912, p. xliv., I gave a note on the dissimilar habitats of different Ithomiines and instanced this species in contrast with the smaller black and transparent forest frequenting species, *Pseudoscada adasa*, *Pteronymia sylvo* and *Hymenitis andromica* form *andania*. The *Ithomiinæ*, however, are never in my experience, to be found right away from the shelter of the forest or patches of woodland. Their flight is slow, and they keep near the ground just as some *Heliconius* species do. The nearest approach in flight amongst the British Lepidoptera that I can think of is perhaps to be found in our winter species of *Geometridæ*, *Hybernia defoliaria*, *H. aurantiaria* or *Oporabia dilutata*, but an even better illustration of the flight is to be found in the dragonfly, *Callopteryx virgo*. Bates speaks of the flight of the *Ithomiinæ* as slow and "that their structure is feeble and unfurnished with apparent means of defence, and living in places which are incessantly haunted by swarms of insectivorous birds." This last observation coming from so experienced a naturalist should carry great weight as to the distastefulness of the group and pave the way for the acceptance of Bates' theory, that these butterflies are mimicked by other butterflies that are not distasteful. The particular mimicking butterflies that struck Bates were the aberrant Pierines of the genus *Dismorphia*, or as he called them the Leptalides, which were found in company with the Ithomiines, but not commonly. Haensch has observed in Ecuador that the mimetic species of *Dismorphia* "such as *D. orise*, *D. theonoë* like the Ithomiids, etc. . . . . are fond of the shades of the thick forest," and that "the bright coloured species such as *D. praxina*, *D. astoycha*, etc., are also found in the lighter places in the woods." These observations confirm my own in Venezuela and Brazil. Although quite a number of Dismorphias seem to suggest a mimetic resemblance to the *Ithomiinæ* there are very few cases where the resemblance is anything, except a general likeness in outline and colour, without special detail. It it is only with those species that are found regularly in the haunts of the shade-loving Ithomiines that real resemblance is shown. Such as *D. melanoë* with *Ithomia onega* as observed by Bates, *D. methymna* with *Heteroscada gazoria*, or *D. pinthæus* with *Aeria eurimedia*, in British Guiana. But before going into the mimicry which surrounds the *Ithomiinæ*, and which is so extensive and forms such a problem in South American entomology, one naturally asks the question if there is any evidence that the group, speaking generally, is a distasteful one. First there is Bates' testimony, followed by many other observers, that the *Ithomiinae* are nearly always exceedingly numerous and occur where insectivorous birds abound. There is the evidence of Dr. Longstaff* that certain Ithomiines that he has examined have a strong scent. He does not always call the scent unpleasant to his own sense, and, as I shall show later, it is highly probable that the unpleasantness is very varying, as there is ample evidence that some Ithomiines mimic other Ithomiines. Then, there is no doubt that notches taken out of the wings by birds are rare compared with similar cases among the *Nymphalidae* or *Satyridae*, and this notwithstanding the much greater ease of attack when one considers the slow, feeble flight of the *Ithomiinae*, whether large or small. I do not know if there is any evidence from the dead specimens, if mites refuse to attack the *Ithomiinae*. It is well known that the true Danaids are a great deal less liable to attack by mites, if not altogether immune. Again, the *Ithomiinae* are very tenacious of life,† a characteristic that is always found associated with unpalatability, and they are coloured above and below alike, a still further character that has been proved to belong to distasteful species. Direct visual evidence that birds dislike the *Ithomiinae* has not as yet been obtained, such as has been done by Mr. G. A. K. Marshall, in South Africa, with other groups, and by Mr. Frank Finn in India. But the sum total of proof by inference is very large, and we are pretty safe in assuming that the *Ithomiinae* are a protected group. At the same time, it is pretty certain that the degree of distastefulness must be very varying in different genera.

Various species of *Melinaea*, *Mechanitis*, *Ceratinia* and *Scada* often occur in vast numbers, whilst species of *Athyrtis*, *Napeogenes*, *Sais*, *Aprotopos* and *Aeria* are for the most part rare, and occur but singly. The species of all these genera are usually coloured and belong to the large mimetic assemblages with which are found species of *Lycorea*, *Dismorphia*, *Eresia*, *Protogonis*, and even *Papilio*. The same difference in abundance is also to be found in the smaller genera of the *Ithomiinae*, but not to such a marked extent. The genera *Leucothyris*, *Pteronymia* and *Dircenna* contain large numbers of species, many of which are exceedingly abundant, while *Hypoleria*, *Velamysta* and *Heterosais* contain far fewer, and usually far less, common species.

The scaling of the *Ithomiinae* is special and peculiar, and has been discussed by Prof. Poulton in "Jour. Linn. Soc.," 1898, pp. 558-612, Pl. 40-43, and by myself in "Ent. Rec.," Vol. xvii., Nos. 4, 5, Pl. III.

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* *Vide* "Trans. Ent. Soc.," 1908, p. 610.

† *Vide* Longstaff, "Trans. Ent. Soc.," 1908, p. 624, also Poulton, "Essays on Evolution," 1908, pp. 279 and 316.

The scales are of two kinds—a long and narrow, and a broader and short kind placed alternately. In large numbers of transparent species the long narrow scales have become hairs standing up away from the membrane, and the broader scales which are shaped like a fan, become greatly reduced in size, so that they have the appearance of the letter Y.

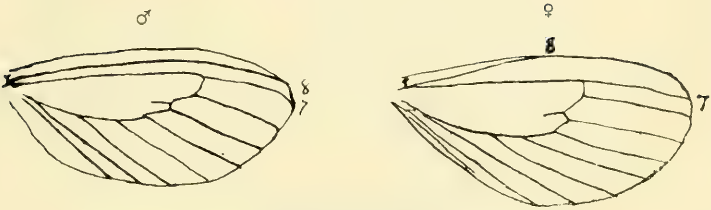
The situations where one finds Ithomiids is very varying, as might be surmised from the very different elevation. Bates found in the Amazon region that they were always present in the darker, denser portions of the forest, especially in the humid areas. He says, also, "I found the number of species to increase in travelling from East to West, from the Lower Amazon to the eastern slopes of the Andes. They were rare in the somewhat drier country which borders the Lower Amazon about the middle course." This account is doubtless true of the Amazon, and probably all low lying similar regions, as I can testify myself from experience in British Guiana, but it is now known that with different altitudes different conditions prevail with those species that inhabit them, but a moist atmosphere seems to be a necessity for their existence. In 1862 there were only 233 species known, and they were very largely lowland species; but now there are 950 known forms, from every elevation up to 10,000 feet at least.

I have left it till now to speak of the remarkable neurational structure of Ithomiine imagines. All the species of the sub-family are structurally different sexually in the hindwing, while the fore-wing remains the same. In some genera such as in *Ceratinia* there are species that resemble species of *Napeogenes*, where the males can with certainty be differentiated by the neuration if not by colour or pattern, but the females are in some cases hardly distinguishable at all. A good example is to be found with *Ceratinia antea* and *Napeogenes glycera*, both from Ecuador. The genera to which these belong are genetically very close, but where strong resemblance is found between species of less closely related genera they can always be separated in both sexes by the structure. In all the larger forms belonging to the most generalized types, such as are to be found in the genera *Olyras*, *Athesis*, *Eutresis*, *Melinaea* and *Mechanitis*, as well as in *Dircenna*, *Ceratinia*, and *Napeogenes*, the great characteristic is that the cell of the hindwing of the male is longer than in the female. The upper discocellular in the male is produced towards the costal margin, forming as it were an extra angular piece to the cell. In *Olyras* and *Melinaea* the difference is small, in *Athesis* and *Mechanitis* it is more marked, but in *Dircenna*, *Ceratinia* and *Napeogenes* it is very great. In *Ceratinia* and *Napeogenes* the cell of the male is almost extended out to the apex of the wing, so that vein 7 becomes almost non-existent, but *Ceratinia* differs from *Napeogenes* in having a veinlet in the cell which is absent in *Napeogenes*. In the female of *Olyras*, veins 6 and 7 are either united, or very close at their origin, while the male always has them much further apart. *Eutresis* is similar to *Olyras*, but *Athesis* begins to show a greater divergence, and the cell in both sexes shows a general lengthening. After *Athesis* the genus that used to go under the name of *Methona*, but which now according to Haensch (who follows Kirby) should be called *Thyridia*, is placed. This seems to me to be wholly wrong, for in the similarity of male to female this genus much more approaches *Olyras* and *Eutresis*. The neuration of the male is scarcely different from that of the female except that vein 8 in the male is more arched, rather reminding one of the position of vein 8 in the males of the genus *Ithomia*. The genus *Aprotopos* is separated from *Thyridia* by the position of vein 8, which in the male runs out to the outer margin, while in the female it abruptly runs to the costa at end of cell, and also by the excessive abortiveness of the forelegs of the male. The genera *Melinæa* and *Mechanitis*, although close, show a number of points of structural differences. In the male of *Melinæa* the veins nearly all run parallel from off the cell, vein 7 is from the upper discocellular, and vein 8, after diverging slightly at base, curves round parallel with the cell and vein 7 to the margin. The tarsal joints of the foreleg also are aborted, but not reduced to a thickened knob, as in *Mechanitis*. In the female the only difference in neuration is that vein 8 is short, and does not extend beyond the cell, curving out to the costa. The foreleg is weak, but normal, with a several-clawed tarsus. In *Mechanitis*, which in the female is sometimes extremely similar in outline and coloration to female *Melinæa*, the species are, at a glance, separated by the short antennæ, but there are many other structural differences. Vein 7 is given off before the end of the cell, and vein 8 runs close to the cell. The cell is not nearly so angled at the discocellular (not separately as in the female) and vein 8 is very short, being given off at the middle of the cell and running only slightly obliquely to the costa. The tarsus is nearly normal, but weak, and has no claws. This character of the clawed female tarsus in *Melinæa* and a few other genera show further affinity with the Danaines, for it is found not only in the true *Danais* but in *Lycorea* as well.

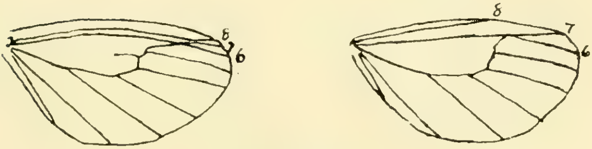
As it would be quite beyond the scope of a short paper to enter into the details of neuration of all the genera, I will only further make some observations on the genera *Leucothyris* and *Heterosais*, the former representing one of the least specialised of the genera of transparent species, and the latter the most specialized. In *Leucothyris* there is comparatively little difference, neurationally, in the sexes, but the genus, as at present constituted, is very variable structurally, and although Godman and Salvin separated *Hyposcada* from *Leucothyris* by the shorter cell of the hindwing, it is practically impossible to say with certainty whether a species belongs to the one or the other, owing to a complete transition of forms. In typical *Leucothyris* male the cell of the hindwing is shaped as in the majority of the genera that contain the larger coloured species; the upper discocellular is produced towards the costa. Vein 5 is in quite a distinctive position, and is a long way above the middle discocellular. Vein 8, after diverging from the cell, returns and runs close to vein 7. In the female the cell is slightly shorter, and vein 8, instead of diverging at the commencement, follows the curve of the cell from the start; but the difference is small for Ithomiines. Although the species vary considerably in shape from rather long narrow wings to much broader and shorter wings, a longer or a shorter cell can occur in either. Of the genus *Heterosais*. which contains but few species, and with which I will conclude, there is a curious development. Vein 6 is entirely absent. It is very weak in *Pseudoscada* and *Hypoleria*, but in addition, in *Heterosais* the cell is open at the upper discocellular in the male. This is a very special development, for when the cell is open, as in the *Nymphalidæ*, it is the lower discocellular that is absent. In the genus *Pseudoscada*, some species have the cell just open in some specimens by the middle discocellular not being united with the lower. This is to be seen in *Ps. exornata*. In the female *Heterosais* the cell is closed, and there is strong similarity to female *Pseudoscada*, except that vein 6 is absent, while in the latter, veins 6 and 7 are usually on a stalk of varying length, but occasionally as in *Ps. utilla* from different origins like *Heterosais*.

Gentlemen, I crave your indulgence for my many shortcomings in this paper. To write a short paper on a big subject as in this case, has been more difficult than writing a long paper on one small matter of detail. The *Ithomiinæ* have been, and are, largely neglected by students of Exotic Lepidoptera, and one hears as the reason that they are less beautiful than other groups and more difficult. The first answer I will ask you to dismiss from your minds, for it cannot be a well-considered statement by any who make it. As for the latter—the one of difficulty—there is certainly more truth in it, but it is not nearly so great as is often averred, and what difficulty there is should stimulate us to fresh endeavours to overcome it.

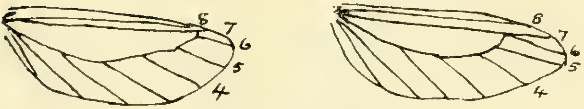
PLATE V.



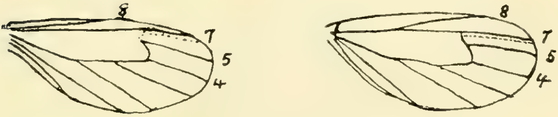
Melinaea cydippe.



Dircenna relata.



Napeogenes cranto.



Heterosais giulia.

Ithomiine hindwings ♂ and ♀.

Entomology with a Camera in Switzerland.

By Hugh Main and K. G. Blair.

(*Descriptive of Lantern Slides exhibited January 8th, 1914.*)

In taking a three weeks' holiday in Switzerland last year, the chief object of the authors was to secure a series of photographs of natural history subjects, mainly of insects ; but it was no part of their programme to form a collection of specimens of the fauna of the district. They had, of course, certain leading ideas that they wished to work out and develop, and with the varied success or failure of these Mr. Main's lantern lecture on January 8th will have made members familiar.

Perhaps the primary object of the trip was to secure a series illustrating the great variety of insect life to be found on the broken rock-faces that form such a feature of the country ; another was to illustrate the development of certain insects whose life histories present features of exceptional interest, more especially those which are not to be found in Britain ; in many cases we could not hope to obtain anything like a complete series of studies in the short time at our disposal, and it would be necessary to supplement the photographs of the creatures taken in the wild by numerous studies of specimens secured and kept in captivity at home.

We left home on June 4th, and arrived in Meiringen the next day soon after noon. Our entomological observations began considerably before our arrival at our destination, for about five o'clock that morning, during the hour or two allowed for breakfast in Basle, we wandered down to the Rhine, and found, on the railings of the embankment, the empty nymph skins of a neuropteron that was new to us. Later on, at Meiringen, the empty skins of the same species were found in numbers along the walls of the gorge of the Aar, but we were quite unable to find any of the imagines that had emerged from them. A few days later, however, we did find a pair, presumably of the same species, at rest on a rail alongside the Reichenbach ; these we afterwards identified as *Perla maxima*, a species that is also British, though frequenting the mountain streams of the northern part of the kingdom, and not found in our south-eastern counties.

In our early days at Meiringen we were rash enough to undertake long walks, carrying camera and impedimenta with us, and keeping an eye open for "subjects" as we went along ; but a very little experience convinced us that the results so obtained were not commensurate with the amount of labour involved, and that a considerable saving of both energy and temper would be effected, combined with an increase in output, if we confined our attentions to working more thoroughly a small area. In the end the majority of our pictures were obtained by taking the train to Brunig, and sauntering leisurely back, sometimes by the upper-road, and sometimes by the lower-road, to Meiringen. The *sine quâ non* of the working party was of course the Photographer, but he was usually accompanied by the Boy, whose duties consisted in carrying a good part of the impedimenta, in finding the next "subject" while one was under treatment, and in holding the umbrella or the sunshade over the camera according to the weather. Frequently, also, they were accompanied by a small, but very select, party of volunteer assistants from the visitors at the Hotel, who rendered very valuable aid in helping the Boy when he was inclined to be overworked, in maintaining a lively conversation at times when the Photographer's patience was sorely tried by the recalcitrance of his patients, and in spectating at all times.

Both the roads mentioned above have a considerable number of exposed rock faces and small quarries along them, and these provided a variety of subjects for the camera. A large proportion of them were, of course, out of reach of the camera, but among the pictures obtained and exhibited on January 8th were the following:—

Parnassius apollo, larva; *Pararge mæra*, chrysalides; *Dianthœcia cæsia; Mamestra dentina; Acronycta euphorbiæ; Glaucopteryx tophaceata; G. cæsiata; Gnophos glaucinaria; Vespa norvegica*, nests; *Polistes gallica*, nest; *Cicindela campestris*, metamorphoses; *Myrmeleon formicarius*, metamorphoses.

The most interesting of these from the point of view of the series, actually obtained in the field, were those of the two species of wasps with their nests. It was too early in the season for the nests of *Vespa norvegica* to have attained their full size, and they most often contained but a single comb, hanging by its central stalk and surrounded by the overlapping layers of the paper covering. Some nests showed the commencement of a second tier, consisting of a few cells only, and suspended by a central column from the middle of the first tier. In these the first workers were already hatched, and the brood could be observed in all stages, from the egg onwards. These nests were usually suspended from overhanging ledges of rock, but one was also discovered in a small heather bush.

In contrast to these covered nests with the cells of the comb vertical, mouth downwards, was the much commoner nest of *Polistes gallica*. This is attached by a single stalk, and stands out horizontally from the rock face, the cells in the comb being also horizontal. Very often the mother wasp would be found sitting quietly at the back of the nest, but if absent would not be long in making her appearance, and would then run about over the mouths of the cells, her antennæ in constant motion, touching everything, and thrust her head into each cell in turn, apparently feeding each larva with a drop of regurgitated fluid. A few of these nests that we brought home to await further developments did not do well. The mother was always very sluggish and loth to leave the nest, seldom feeding the brood, and though some of the larvæ span up, the mother eventually died, and the pupæ died in their cells. It is probable that the aid of the mother is required to help the young wasp out of its cell.

A subject with which we had more success was the tiger beetle. *Cicindela sylvicola* was common along the roads in the pine woods, and we soon discovered the holes of tiger beetle larvæ in numbers in the banks by the roadside. If we watched one quietly for a little while the larva would come to the surface and block the hole with its head, but at the slightest movement was down again like a flash. If we placed a fly or spider or caterpillar near the mouth of the hole, the larva would very quickly perceive it and with a movement so quick that the eye could not follow it, fling itself on the prey, retaining its hold on the burrow only by means of the hooks on the hump of the fifth abdominal segment and the stiff hairs on its tail pressed against the walls, and disappear with its booty down the burrow. Whether it devoured its prey at once or not we did not determine, but it was very soon back at the entrance looking for more ; one larva in this way took two bluebottles, a spider, a beetle, and a small caterpillar within a few minutes of one another. In digging out a number of the larvæ to take home we found both small larvæ and those about full grown, and also turned up a few beetles of *C. sylvicola* and a single *C. campestris*, but did not find any pupæ. These larvæ did very well in captivity, and would readily adapt themselves to burrows made with a piece of stick against the glass of a glass-fronted box. Here, when full-grown, they would make a cell at the bottom of the burrow, using the excavated material to fill up the shaft of the burrow. By gently removing the glass without disturbing the occupant, successful photographs were obtained of the larva in its burrow, the larva lying on its back in the cell awaiting pupation, the pupa supported on its dorsal tubercles with their spines, and the freshly emerged beetle. Some of the beetles completed their metamorphoses in the autumn, while others have remained in the pupal state all the winter, and yet others have hibernated as larvæ. All the beetles that have yet emerged have been *C. campestris*.

Another insect that we were anxious to obtain and photograph in its early stages was the ant-lion (*Myrmeleon formicarius*). Some years previously Mr. Main had received an ant-lion fly from a friend at Meiringen, but though we were on the look-out for it, the end of our holiday was approaching before we discovered it. Then, one day, as we were watching some tiger beetle holes, a passing road-mender asked if we had found the "Ameisenlöwe." That sounded hopeful, and further conversation elicited the fact that they were to be found about a mile away, and our informant volunteered to take us to the spot. It turned out to be about three miles back along the road we had just come, at a place where the road was bordered by a bit of low, rather overhanging cliff. On some shallow ledges on this where a little loose earth had accumulated were the very inconspicuous circular depressions we were looking for, and a finger very quickly ejected a plump antlion larva from the bottom of each. It was a wet day and we had not the camera with us at the time, but determined to come next day, whatever the weather, as it was our last. However, later in the day we passed other places of similar character, sheltered ledges on which loose earth and flakes of shale had accumulated, and in nearly every case, now we knew what to look for, we found the antlion, more numerous, better situated for photographing, and much nearer home than in our first situation.

The larvæ were found in various stages, from quite small up to full-grown, and a few of the round bullet-like cocoons were also found, but all empty. In the neighbourhood of the pit were usually to be seen the dried empty carcases of a number of ants, earwigs, beetles, and spiders. Some of these larvæ that we brought home have thriven very well. A few very soon spun their cocoons beneath the surface of the soil, and from these the flies duly emerged, but the majority are hibernating as larvæ, and will probably not spin up until June. When the perfect insect is ready to emerge, the pupa tears a hole in the wall of the cocoon with its jaws, and thrusts out the fore part of its body, and the fly emerges; sometimes the pupa leaves the cocoon entirely before the emergence of the fly. The ant-lion fly is a sluggish creature with a very weak flight. We could not at first get them to feed, and many of them died within a few days of emergence; but eventually Mr. Main found that if one were held upside down by the wings, it would then hold a small fly with its legs and nibble at it. In this way, by feeding them every day, he kept them alive over two months, and succeeded in getting ova from them. These were oval in shape, green, with a small white spot at each end; unfortunately they were not fertile and shrivelled up.

Very soon after emerging, the imago drops an elongated sausage-like body, of a pinkish-grey colour and a somewhat porcellaneous texture. On breaking this open it is found to consist of a solid black mass enclosed in a chalky coat. The black central portion of it is a mass of excremental matter that has apparently been accumulated during the whole larval life of the ant-lion. Its food during this period being composed wholly of fluid sucked out of the bodies of its victims is almost completely digested, so that there is very little excremental matter to get rid of; so little in fact that no provision is made for its removal, for the alimentary canal does not open behind. It is possible that something is ejected at the various larval moults, but we have been able to find no indications that this is so, and it is almost certain that the whole is stored up until just after the final change of form. The porcellaneous coating to the mass is, in our opinion, homologous with the milky or chalky fluid ejected by a moth or butterfly on emergence, and is composed of urates, etc., formed as a waste product during the profound metabolic changes that have been taking place during the pupal and late larval stages.

Another interesting feature of the ant-lion that we wished to investigate was the odour said to be emitted by the perfect insect. This we were able to confirm, but the odour is faint, and not constant; it is most readily perceptible after the fly has been indulging in violent exercise, and is most strongly developed in the male. In the females we could not always agree whether it was present or not. This odour has been said to resemble that of ants (formic acid ?) and to be derived probably from the ants upon which the larva has fed ; but we found that it was present in a like degree in flies bred from larvæ that we had had in captivity for more than a year, during which time they had been fed mainly on caterpillars, and had certainly never tasted ants. The odour was clearly not that of formic acid, but it is difficult to say what it does resemble. It will be recalled that a fairly strong odour is also emitted by the lace-wing fly, a near relative of the ant-lion, but no one has suggested that this is the odour of the aphides on which the larva has fed.

Finally, we may mention one other object of our excursion, and one with which we had no success. This was to obtain the early stages of *Ascalaphus*. *A. coccajus* was common enough in some of the Alpine meadows, but we were totally unsuccessful in obtaining the ova, larvæ or pupæ, either in their natural haunts or from living specimens that we brought home. We hope to investigate this matter further in the coming season, and if any Member will help us to obtain the requisite material, we shall be most deeply grateful.

EXPLANATIONS OF PLATES VI. TO IX.

PLATE VI.

LIFE-HISTORY OF THE TIGER BEETLE.

Cicindela campestris.

1. Head of larva at entrance of burrow. × 2.
2. Larva in burrow, extended. × 1.
3. Larva resting contracted in burrow. × 1.
4. Larva. × 2.
5. Fifth abdominal segment of larva, with dorsal hooks. × 4.

PLATE VII.

LIFE-HISTORY OF THE TIGER BEETLE.

Cicindela campestris.

1. Larva in cell awaiting pupation. × 1½.
2. Beetle still in its cell after emerging from pupa. × 1½.
3. Pupa and empty larval skin in cell. × 1½.

PLATE VIII.

LIFE-HISTORY OF THE ANT-LION.

Myrmeleon formicarius.

1. Home of the Ant-lion. Switzerland.
2. Larva, dorsal surface. × 2.
3. ,, ventral surface. × 2.
4. Pupa, male. × 2.
5. Pupa, female. × 2.

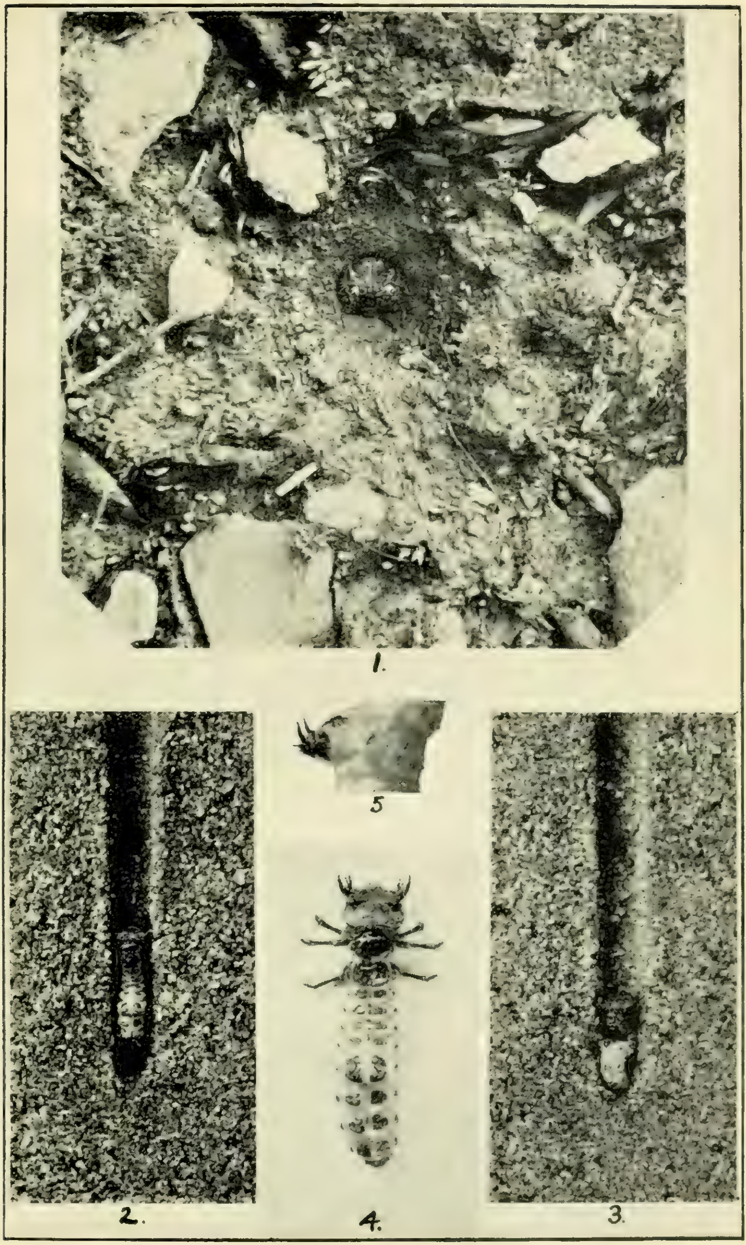
PLATE VIII.

LIFE-HISTORY OF THE ANT-LION.

Myrmeleon formicarius.

1. Pit of Ant Lion. × ½. Switzerland.
2. Larva burrowing backwards into the sand. × 1.
3. Cocoon. × 1.
4. Imago, female. × 1.
5. Larval excreta, deposited by imago after emergence. × 5.
6. Ova. × 5.

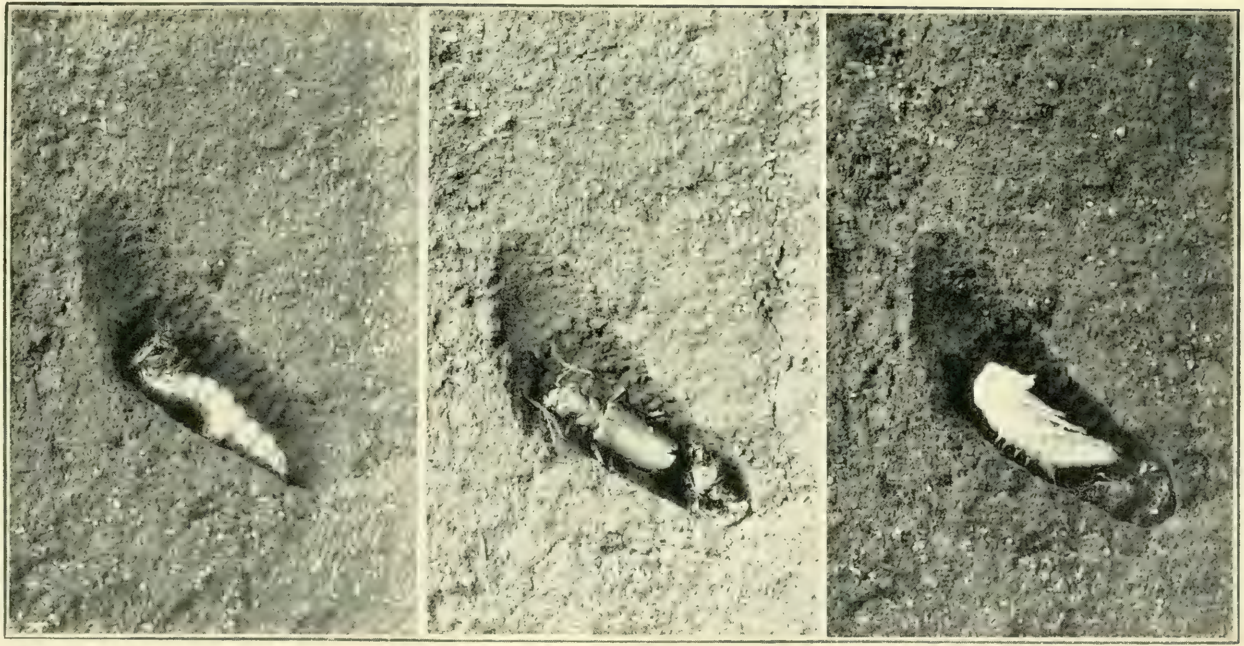
PLATE VI.



Photos by Hugh Main.

Life History of the Tiger Beetle.

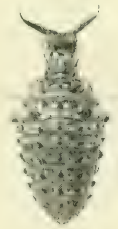
PLATE VII.



Photos by Hugh Main.

Life History of the Tiger Beetle.

PLATE VIII.



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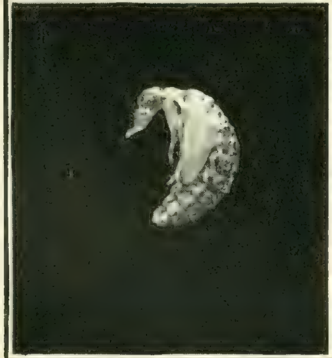

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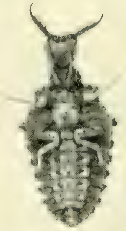

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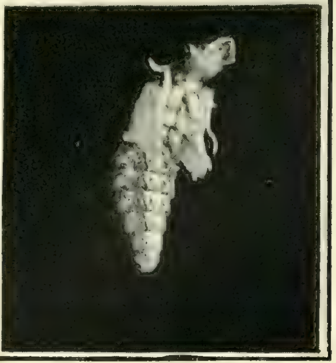
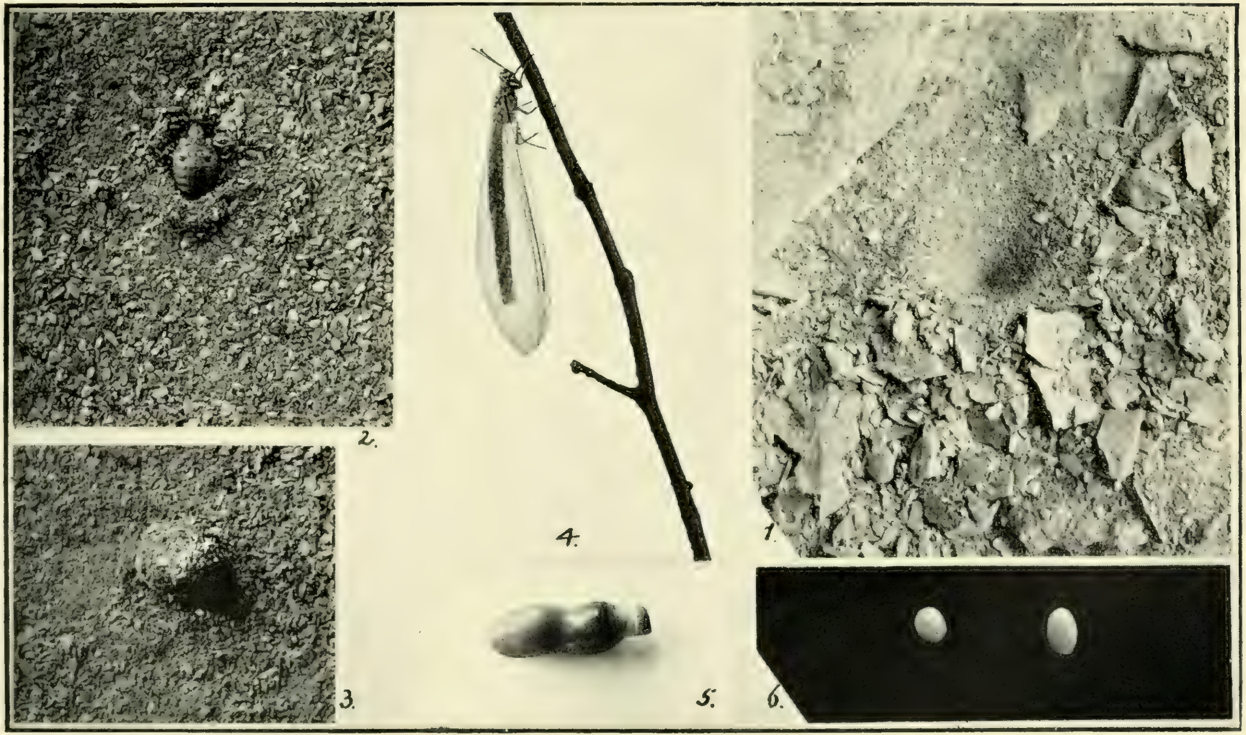


5.

Photos by Hugh Main.

Life History of the Ant-Lion.

PLATE IX.



Photos by Hugh Main.

Life History of the Ant-Lion.

ANNUAL ADDRESS TO THE MEMBERS

OF THE

South London Entomological and Natural History Society.

By A. E. Tonge, F.E.S.

Read January 22nd, 1914.

LADIES and Gentlemen,—Once more I think we can congratulate ourselves on the flourishing state of our Society. The fact that our list of members is slightly smaller than last year is a little misleading, as the number of new members elected during 1913 was double the number of resignations received, while only one name has been removed by the hand of death, that of Lord Avebury, who had been an honorary member since the foundation of the Society in 1872. The difference may be accounted for by the removal from the roll of the names of several members who have been out of touch with our executive for several years, and would consequently have been struck off inevitably sooner or later.

Our financial position has improved under the able guidance of our invaluable treasurer, and if the amount of the donations to our Publication Fund has not yet reached quite so large a total as it did in 1912, the extra receipts from the increased rate of subscription will help materially to adjust the deficit.

I am glad to notice that our Field Meetings have met with more support. We did not hold quite so many of them as last year, but they have been more largely attended, particularly Mr. W. J. Kaye's outing to Netley Heath. No doubt this may be largely attributed to the better weather we enjoyed, but I still feel that members might attend in larger numbers, if only to show that they appreciate the labours of your Council, and if those interested would offer suggestions of a practical nature as to visiting new or more favourable localities, it would encourage those responsible for them to enlarge the scope of these highly enjoyable gatherings.

The number of members and friends attending our ordinary meetings keeps up in a satisfactory manner, and if we failed to beat the very high record set up at the Annual Exhibition in 1912, we only did so by a very small margin, while I am quite confident that the interest and enthusiasm shown, and the quality of the exhibits, were in no way inferior at our Annual Exhibition in 1913. The interest created by our Special Exhibition of orders other than Lepidoptera was exceedingly gratifying to those responsible for its organization.

The number and excellence of the papers read before our Society have been a very marked feature of the year and have undoubtedly been largely responsible for the large attendances, as they have attracted considerable attention both inside and outside the Society; while the very handsome addition to our collections of British Lepidoptera made by Mr. W. G. Dawson, of Worcester, has enabled the curators to fill up so many of the blank spacies in the cabinets, that, as a means of reference for the identification of captures, especially for our younger and less experienced members, the prestige ot the collection possessed by the South London Entomological and Natural History Society should stand very high indeed.

From a collecting point of view the past season has been disappointing. I have heard it described as the "Sunless Summer," and I think there can be little doubt that the number of fine but dull days was abnormally large. Friends who devote their energies to different orders of insects have invariably written to me reporting disappointing results; and so far as my own personal experience goes, I can fully sympathize with them. I took fewer insects and met with fewer interesting species than for several years back. There seemed to be no larvæ to beat, and nothing on sallow or ivy bloom but the commonest insects, while never once throughout the whole season did I enjoy what I could describe as a "good night at sugar," and my results at light compared very unfavourably with 1912.

From the number of *Colias edusa* noticed and recorded in the spring it appeared probable that this species would be common later on in the season, but except perhaps in some especially favoured localities I do not think this early promise can be regarded as having been fulfilled.

A few fine varieties have been taken, among those I have seen perhaps the most striking being a wonderful *Pyrameis cardui*, bred by Mr. R. M. Prideaux, from a pupa found wild by him at Brasted Chart, Kent; *Brenthis euphrosyne*, taken near Eastbourne by Mr. E. P. Sharp, with the ground-colour of all four wings cream colour; and *Agriades thetis*, taken at Folkestone by Mr. L. W. Newman.

During the past year an association has been founded, under the presidency of the Rt. Hon. W. J. Lowther, M.P., called the Society for the Promotion of Nature Reserves. The council includes a number of well-known naturalists, and the object in view is to collect all information possible regarding areas of land in the United Kingdom which yet retain their primitive characteristics, and harbour rare and local species of fauna and flora; and to devise means whereby such may be preserved from extinction, and secured for the enjoyment of posterity in their natural state. No subscription is asked for from members, who are elected by invitation of the executive committee.

An event of considerable importance to our members during the year was the purchase of Box Hill. This favourite locality has been seriously threatened for some time past with the very unwelcome attentions of the builder, but it has now happily, and through the munificence of a private individual, been purchased outright and handed over to the National Trust for preservation in its natural state in perpetuity.

The study of Entomological Science is so widespread nowadays, and such a very large number of the inhabitants of our globe are interested in it to a greater or lesser extent, that it becomes inevitable year by year for an increasing number to be removed from amongst us. During the past year we have had to deplore the loss of one of our oldest members, The Rt. Hon. Sir John Lubbock, first Baron Avebury, who passed away on May 28th, at his residence near Ramsgate, at the age of 79. He was at the time of his death Senior Fellow of the Entomological Society of London, having been elected in 1850, and during his long term of fellowship he twice occupied the presidential chair, as well as serving frequently on the Council, and contributing many valuable papers to its transactions. Among entomologists he was familiar to all as the author of "Ants, Bees and Wasps," "The Origin and Metamorphoses of Insects," "British Wild Flowers considered in their relations to Insects," "Monograph of the Collembola and Thysanura," etc., etc.; while to the larger public he was affectionately known as the father of "Bank Holidays." His name was also very familiar to me personally as being one of the oldest members of the Holmesdale Natural History Club, of which I have for some years been hon. treasurer.

On January 19th died the Rev. J. Sandy Brown, the *doyen* of the Norfolk and Norwich Naturalists' Society. He was an all-round naturalist, photographer, and microscopist, and made a large collection of specimens: among them the rare hemipteron *Aphelochirus æstivalis*, which he met with in the Norwich river.

George Baker, who died early in February in Guernsey at the ripe age of 83 years, was one of our keenest lepidopterists of half-a-century ago. He bred *Gastropacha ilicifolia* from wild larvæ collected on the Sheffield moors in 1860. Later in life he was intimately associated with Harpur Crewe in working out the life-histories of the *Eupitheciæ*, and himself discovered the larvæ of several species. He was for many years joint curator with the late John Sang, of the collection owned by the late Dr. Mason, of Burton-on-Trent, being obliged to give up the work in consequence of the loss of an eye, as a result of the close application entailed. Latterly he had lived in Guernsey, and retained his active interest in Lepidoptera to the last, several species being added to the local fauna as the result of his labours.

Dr. Auguste Puton, a prolific writer on Palæarctic Hemiptera, died after a brief illness at Remiremont, France, on April 8th last. He joined the Société Entomologique de France in 1856, and was Senior Honorary Member at the time of his death. His "Catalogue de Hémiptères (Hétéroptères, Cicadines, et Psyllides)" was well known to all students of the order. For some years before his death he appears to have given up Entomological pursuits.

The death of Herbert Druce, on April 11th, at the age of 67, removed one of our best-known exotic lepidopterists. He was elected Fellow of the Entomological Society in 1867, and served on the council in 1885 and 1892. Large numbers of species were described by him in the "Proceedings of the Zoological Society of London," and the "Annals and Magazine of Natural History" over a long series of years, his principal work being the Heterocera of the "Biologia Centrali-Americana," in three volumes. The first collection (Rhopalocera) made by him is now in the British Museum, while the bulk of his second and larger collection has passed into the hands of Capt. Joicey of Godalming since his death. His son, H. H. Druce, F.E.S., has inherited his father's tastes to a very marked degree, and is, if possible, an even more devoted student of entomology.

Philip de la Garde, R.N., who died at Exeter on May 12th last, in his 45th year, was a keen coleopterist. He was for a time in the Royal Navy, and rose to the rank of Paymaster; but owing to failing health he was invalided in 1905, and spent the rest of his life in various places in Devonshire, adding new species to the local list and frequently recording the capture of rare or local species. He had already drafted a skeleton plan for a new list of the Coleopterous Fauna of Devon, and there can be little doubt that had he been spared he would have accomplished a large amount of valuable entomological work.

Dr. Arnold Pagenstecher, of Wiesbaden, who was a noted ear specialist, died on June 11th. His wide interest in entomology is evidenced by his very useful work, "Die Geographische Verbreitung der Schmetterlinge," published in June, 1909. His collections of the *Libytheidæ* and *Callidulidæ*, two families of which he published a revision, are now in the Natural History Museum of Wiesbaden.

Professor Odo Morannal Reuter, a distinguished Finnish entomologist, died at Obo, his native town, on September 2nd last, aged 63 years. He was elected a Hon. Fellow of the Ent. Soc. Lond. in 1906. He was an authority on Economic Entomology, and a prolific writer on some of the less studied groups of insects, no fewer than five pages of the Catalogue of the Ent. Soc.'s library being taken up with the list of his Separata on Hemiptera—Heteroptera, Thysanoptera, and Collembola, chiefly published through the Finnish Society of Sciences. Although afflicted with blindness for the last five years of his life, Prof. Reuter maintained his energy to the last, and the German and Finnish editions of a work on the habits and instincts of solitary insects were actually in the press at the time of his death, while an extensive paper on the myrmecomimetic Hemiptera engaged his attentions all last summer, and it is to be hoped may be finished for publication by another hand. He was, in addition to his other gifts, a poet with exceptional powers of observation and descriptive language, and devoted considerable attention to the folklore and literature of his native country.

Alfred Russel Wallace, O.M., D.C.L., F.R.S., who may be described as the last of the pre-eminent naturalists of the nineteenth century died on November 6th, at the advanced age of 91. So far back as 1845 he was collecting Coleoptera with H. W. Bates, and three years later they set out together to the Amazons. His earliest book, "Travels on the Amazon and Rio Negro," described his adventures and observations in this region. Soon afterwards commenced his stay of eight years in the remote East, during part of which time he lived alone on the mainland of New Guinea. During this period he collected an enormous number of species new to science, and the resultant book, the "Malay Archipelago," published in 1869, is one of the most fascinating works on natural history travel extant. On June 1st, 1863, after his return, he was elected a Fellow of the Entomological Society by acclamation, and without formal ballot, as a slight recognition of the vast services he had rendered to science. He was president of the Society in 1871-2, and in 1878 published his great work on geographical distribution; while about this time a large number of important papers from his pen, on systemic and general entomology, appeared in the scientific press. In 1908 he received the Order of Merit at the hands of H.M. the late King Edward, a fitting culmination to the long list of scientific honours which had already been conferred upon him. Up to the last he maintained his mental and physical activities, and an important paper by him on the social questions in which he was so deeply interested, was published only a few months back.

Count Michael Nikolaievitch Rostortseff, a member of the Russian Entomological Society, died during last year at the age of 44. Although perhaps not widely known in entomological circles outside St. Petersburg, he was regarded by his many personal friends as a charming and gifted man. He collected insects extensively in 1908 in the South of Italy and in Northern Africa.

Amongst the many publications of interest to the entomologist issued during 1913 it is impossible to attempt the compilation of anything like a complete list in this address, but I will endeavour to mention as briefly as possible some of those which have been brought particularly under my notice.

"Catalogue des Lépidoptères observès dans l'Ouest de la France, Part I. Macro-lépidoptères," by Henri Gelin and Daniel Lucas, provides a reliable review of the whole Atlantic region from Finistere to Basses Pyrénées and can be thoroughly recommended to the British student collector, as well as to those who spend their holidays on the Continent.

"Catalogue of the Lepidoptera Phalænæ in the British Museum," Vol. xii., by Sir George F. Hampson, Bart, deals with the *Catocalinæ* and is the twelfth volume of the *Phalanæ* and the ninth dealing with the *Noctuidæ* so far published.

"Catalogue of the Lepidoptera of Northumberland, Durham and Newcastle-upon-Tyne," by the late John E. Robson, F.E.S., Vol. ii., Part II., deals with the *Tineina* and *Pterophorina*, and completes this important work.

"The Dictionary of Entomology," by N. K. Jardine, F.E.S., purports to give the the true meaning of the descriptive terms used by entomologists.

"Diptera Danica," by William Lundbeck, Part IV., is the fourth volume so far published, and deals with the *Dolichopodidæ*. The text is English, and the bulk of the species mentioned are to be found in the British Isles.

"The Entomologist's Logbook," by Alfred Scorer, F.E.S., is a stupendous compilation, arranged in alphabetical order, of the whole of the British Macro-lepidoptera, giving at a glance Latin and English names, times of appearance, foodplants and similar information, regarding all stages, calculated to be of use to the practical collector. The book is interleaved with blank paper for the entry of additional observations by the reader.

"Psyllidarum Catalogus," by Dr. G. Aulmann, is a synonymic Catalogue of the *Psyllidæ* of the world so far as these minute homopterous insects have been made known to science.

"Review of Applied Entomology," a monthly periodical issued by the Imperial Bureau of Entomology, gives abstracts, etc., of publications on these subjects from all parts of the world. The editor is Mr. Guy A. K. Marshall, F.Z.S.

"Text-book of British Butterflies and Moths," by L. W. Newman and H. Leeds, is a well arranged and practical handbook of reference for the collector and breeder of British Lepidoptera, enabling him to settle any doubtful point in the life-history of a particular species with a minimum of delay, and should be in great demand with the coming generation of young entomologists.

"The Large Larch Sawfly, *Nematus erichsonii*," by C. Gordon Hewitt, D.Sc., contains an exhaustive account, fully illustrated, of an insect pest, treated to a large extent as British.

"The Life History of *Panorpa klugii*, McLach.," by T. Mijake, is an important contribution to our knowledge of the genus, and describes in detail the methods by which the author was able to rear the insect from the ovum through its entire life cycle.

"The North American Dragonflies of the Genus *Æschna*," by E. M. Walker, B.A., M.B., is obviously the work of an experienced field naturalist, and contains elaborate keys for the identification of both sexes, as well as such nymphs as are known to science, of the sixteen North American species of the genus; one of these being also found in Britain. There are also fifty-six pages devoted to the biology and bionomics of the group.

"The remarkable Life-history of a new family (*Micromalthidæ*) of Beetles," by Herbert S. Barber, Bureau of Entomology, Washington, D.C., a paper which appeared in the Proceedings of the Biological Society of Washington, Vol. xxvi, contains a further account of the life-history of a North American beetle, *Micromalthus debilis*, Lec., and the facts already brought to light are more than sufficient to justify the claim that the life-history of this beetle is "the most remarkable in the Coleoptera if not one of the most remarkable in the whole Class Insecta." Mr. Barber hopes to give a complete account of the life-history later.

"The Theory of Evolution in the light of facts," by Karl Frank, S.J., with a chapter on Ant Guests and Termite Guests by Erich Wasmann, S.J. Translated from the German by T. Druery, F.L.S., attempts to show the limitations of Evolution by arguments based chiefly upon the imperfection of the palæontological record. The chapter by Father Wasmann is very interesting, and contains a table of interest to Coleopterists, illustrating the pedigree of the beetles and their distribution in time.

"The Life of the Fly," by J. Henri Fabre, another of this talented author's popular volumes, made its appearance during the past year. Interspersed among other matter are some chapters of autobiography which will enable such as desire to do so to know more of the writer, whose avowed object is to make the younger generation love natural history; and it would be hard to name a happier mentor, for such as make their investigations under M. Fabre's guidance.

"British Butterflies," by A. M. Stewart (Peeps at Nature Series), with really excellent coloured plates illustrating by the three colour process practically every British butterfly on a slightly reduced scale, can be confidently recommended to the incipient lepidopterist as a very useful introduction to knowledge of the subject.

"The Coleoptera of the British Islands," by W. W. Fowler, M.A., D.Sc,, F.L.S., and Horace St. John Donisthorpe, F.E.S., Vol. vi., Supplement, collates, amplifies and brings together the enormous amount of new matter which has been published from time to time since the issue of the original five volumes in 1887 and 1891, bringing it right up-to-date. Mr. Donisthorpe's chapter on the Myrmecophilous Coleoptera, and list of additional Localities and Notes, in the second part of the volume, ensures the omission of nothing which can be regarded as of importance to the student of the order.

"How to use the Microscope: A Guide for the Novice," by the Rev. Chas. A. Hall, is a well-written and well-illustrated little book, which will be found most useful by those who are as yet unfamiliar with the manipulation of this indispensable aid to entomological study.

Records of species new to the British list in various orders include—

COLEOPTERA: 24 species, for details of which I will refer my readers to the entomological magazines, as they are too numerous to be set down within the limits of this paper.

DIPTERA; 44 species may be found in detail in the same place.

SIPHONAPTERA: I understand that a large budget is on the eve of publication in the Plague Supplement to the "Journal of Hygiene" (Indian), but that apparently no new species have been actually recorded during the past year.

HEMIPTERA: Two new species are recorded this year—*Psyllopsis distinguenda*, taken in the New Forest by Mr. Champion, and *Aspidiotus bavaricus*, from Chester and Aberdeen, recorded by Dr. Leonard Lindinger, of Hamburg.

HYMENOPTERA: I find 4 new species recorded under this head—*Polistes gallica*, a wasp common on the continent, but hitherto unrecorded here, was taken at Chandler's Ford, Hants, by Major Robertson. *Crabro kiesenwetteri*, a fossorial Hymenopteron, belonging to the sub-genus *Rhopalum*, was taken in Suffolk by Lieut.-Col. C. G. Nurse. *Halictus decipiens*, a bee very difficult to separate from the common *H. quadrinotatus*, is recorded by Dr. R. C. L. Perkins as occurring in Devon, Oxford, Norfolk, and Suffolk. *Monoctenus juniperi*, is identified by Rev. F. D. Morice from specimens in the Coll. Univ. Camb. taken by Messrs. H. Scott and C. G. Lamb in Scotland, 1907.

LEPIDOPTERA: Apparently the only new species recorded last year was a micro-lepidopteron new to science, *Scoparia vafra*, which is recorded by Mr. E. Meyrick, a specimen having been taken some years ago, near Chester, and sent to him with other insects for identification by Dr. H. Dobie of that town.

NEUROPTERA: No new species appear to have been recorded, but I hear that Messrs. W. J. Lucas and G. T. Lyle have succeeded in elucidating a very important part of the life-history of the snake-flies, *Raphidia maculicollis* and *R. notata*, of which particulars will be published shortly.

ORTHOPTERA: Apart from the increasingly large number of aliens which come over with the imports of foreign plants, among which the large Japanese locustid, *Diastrammena marmorata*, may be mentioned, there appear to be no records of species new to our list.

ODONATA: Mr. Lucas informs me that things have been remarkably quiet this year, and mentions merely the capture of *Agrion hastulatum* in fair numbers at Aviemore last June, by Col. J. W. Yerbury.

PLECOPTERA: One new species has been added to the British list, and recorded provisionally under the name of *Chloroperda venosa*, by Mr. Kenneth J. Morton, from the Trent district.

TRICHOPTERA: A new species *Agraylea pallidula* is recorded by Rev. A. E. Eaton, a male specimen having been taken in Berkshire by Mr. M. E. Mosely, and I hear that other interesting discoveries by the latter gentleman in this family (*Hydroptilidæ*) have yet to be recorded.

THYSANOPTERA: Three new species are recorded by Mr. R. S. Bagnall from Oxfordshire, under the names of *Haplothrips cephalotes*, *H. juncorum*, and *H. obscuripennis*.

This concludes my notes on the current events of the year, but before I proceed with the later portion of my address I wish to take this opportunity of correcting a mis-statement which I made inadvertently in the paper I had the honour to read before you this time last year. I there stated that I believed we were indebted to the late Mr. J. W. Tutt for the suggestion of dividing lepidopterous ova into upright and flat groups, but I have since ascertained that the idea originally emanated from Dr. T. A. Chapman, and to him particularly I tender my apologies.

I have chosen for the subject of my address this evening, as is perhaps to be expected, lepidopterous ova; and have restricted my remarks, which I regret to say you will find both incomplete and mainly superficial, to the consideration of species I have either found myself laid wild, or which have been sent to me by friends on whose accuracy of observation I felt I could rely.

The nomenclature and arrangement I have borrowed from Mr. South's recently published series of three volumes on the Butterflies and Moths of the British Isles; and the dimensions of the various ova given are for convenience expressed in decimals of a millimetre.

With this preliminary explanation I will proceed to inflict upon you my notes

ON SOME BRITISH LEPIDOPTEROUS OVA LAID WILD.

Pieris brassicæ lays her ova in batches of varying size, and anyone who cares to take the trouble to turn over the cabbage leaves in a field or garden can easily find them on the under-surface. The ova are golden-yellow in colour, upright, spindle-shaped, with prominent sculpture consisting of fifteen longitudinal ribs connected with a large number of horizontal rungs and finished off around the point or micropylar area with a ring of rather paler colour. They are about 1·1mm. high and ·4mm. wide at the point of greatest girth.

A female, which I found commencing to oviposit under a seakale leaf in the middle of May, had gone twenty minutes later, and left a batch of 49 ova. I have also found these ova on nasturtium leaves and those of other plants of a similar nature, always underneath.

Pieris rapæ also lays her ova under the leaves of *Cruciferæ*, but singly and not in batches, though several may be found on the same leaf. When fresh laid they are transparent greenish-white, but soon turn a waxy-yellow. Similar to *P. brassicæ* in shape, but blunter and with only nine longitudinal ribs. Their height is about 1mm., and width ·4mm.

Pieris napi lays her ova, no doubt, on many kinds of plants, but I have personally always found them on the leaves and stalks of the common hedge mustard in late May and early June; usually underneath a leaf and laid singly. They are white when newly laid, with a greenish tinge, turning yellowish, and finally almost slaty. In shape similar to *P. rapæ* with fifteen longitudinal ribs, of which not more than nine extend the whole way up to the micropylar area. Height 1·1mm., maximum width ·4mm.

Euchloë cardamines.—This ovum will probably be one of the first to be found in the wild by those who are sufficiently interested to look for it. Prominent plants of hedge mustard growing in country lanes are almost certain to have one or more on them in late May or early June. They are usually laid on the young seed-pod or flower-stalk near the top of the plant, singly and upright, standing out at right angles with the supporting base. When freshly laid the colour is greenish-white, turning quickly to orange, and just before the larva emerges they become almost black. The shape is typically pierid, *i.e.*, spindle-shaped, with about thirteen bold longitudinal ribs, and the approximate size may be put as 1·1mm. in height, by ·5mm. wide. The insect also lays commonly on cuckoo-flower, but owing to the nature of this plant I do not consider the ova so easily to be found on it.

Gonepteryx rhamni.—Ova may be found underneath the leaves of buckthorn during May, and are usually deposited singly on, or between, the prominent ribs of the young leaves near the tip. Very occasionally I have seen them on the twigs. The favourite spot seems to be an outstretching branch which occupies a prominent position on the sunny side of a green ride in a wood, and although I consider that the butterfly only lays its ova singly, several may be found on one leaf in such situations. Probably several individuals in passing select the same leaf to oviposit upon, owing to its especial suitability. I have seen as many as seventeen in this way on a single tiny shoot, and so crowded were they together that in some cases ova had actually been deposited on other ova instead of on the leaf. The colour, when freshly laid, is pale greenish, turning quickly to lemon-yellow, and darkening to almost a slate colour before hatching. In shape they are an elegant tapered spindle, about 1·3mm. high, and with a maximum width of ·5mm., and very beautifully sculptured, with twelve longitudinal ribs, which, however, are not as prominent as in other species; and between these is the usual arrangement of many horizontal rungs.

Limenitis sibylla lays one of the most highly specialized ova I have so far met with. It is deposited singly on the leaves of honeysuckle in July and early August, and the butterfly appears to prefer plants hanging from forest trees a few feet up from the ground, and in situations which are not fully exposed to the direct rays of the sun. In shape the ovum is remarkably like the fruit of the blackberry, about ·9mm. high, and ·8mm. wide, with a flattened base; upright as is usual with butterfly ova, but the sculpture instead of taking the form of ribs and rungs, consists of large hexagonal pits roughly arranged in rings from around the micropylar area, and with short spines standing out from the angles of these hexagons. The colour is a pale greenish-yellow, showing purplish cloudings as the larva within matures, and finally becoming almost black when on the point of hatching.

Vanessa urticæ.—I have only found these ova wild laid by watching the parents early in May, and so locating the selected site, as it would be a somewhat hopeless task to examine the leaves of a whole bed of nettles in the expectation of discovering the right one. The underside of a young leaf a little below the tip of the shoot seems to be a favourite position, and the eggs are deposited in a compact bunch or cluster containing anything up to a couple of hundred. They are bright green in colour, of a shade exactly corresponding with that of the surrounding leaves, and each egg is sculptured with eight or nine very bold whitish longitudinal ribs, and the usual lateral rungs. In shape they are upright and somewhat cylindrical, flattened at the base, with a distinct depression at the micropylar end, due to the top ends of the ribs rising slightly above the level of the eggshell itself. Height ·65mm., width ·5mm.

Vanessa io.—Unless the parent is identified with the ova when found wild they will be very difficult to separate from those of *V. urticæ*, as both insects choose similar situations and lay in a similar manner, in clusters or batches. The only differences I have been able to note are that the ova of *V. io* are more *olive* green in colour, and that the average number of the longitudinal ribs is inclined to be less, namely, seven or eight. Certainly eight is the more usual. Height, ·65 mm.; width at widest part, ·45 mm. I fancy that the ova of *io* are slightly less bulky than those of *urticæ*, but a large number of comparative measurements would be needed before this could be set down as a point of distinction.

Pyrameis atalanta also lays its eggs on stinging nettle, selecting the young leaves near the top of the plant; but unlike the two foregoing species it lays them singly, and on the upper surface of the leaf, in almost any position that hangs conveniently. I have several times watched this butterfly ovipositing in early July, and have picked each leaf the insect rested upon as soon as it had flown to another. So far I have never found more than one egg on a leaf. They are quite vanessid in type, green in colour, and with nine or ten very bold longitudinal ribs carried right up to and over the top to the edge of the micropylar area. The dimensions of an average ovum are ·7 mm. × ·55mm.

Argynnis euphrosyne.—I have seen these ova laid wild in late May and early June on both violet and petty whin, underneath the leaves. The number deposited on a leaf varies from one to three, and not infrequently they are attached by the side instead of the base, as though but imperfectly cemented in position by the parent insect. The ovum is a very blunt pointed cone in shape, about ·8mm. high and ·7mm. wide at the widest point, which is just above the base. It has 28 to 30 vertical ribs, about half of which join others before reaching the micropylar area. The sculpturing is not so bold as in, say, *Vanessa*, and the colour is whitish-green when laid, lemon-yellow later, and dark brownish at maturity.

Zephyrus betulæ.—So far the eggs of the species I have described are thin-shelled, showing the larval changes inside through the partial transparency of the shell, and so accounting for the marked changes in the colour of the egg at different periods. We now come to a species which has a much stouter and more opaque covering, for the purpose, no doubt, of protecting the enclosed embryo during the rigours of winter. *Z. betulæ* lays her eggs singly as a rule, but sometimes in twos or even threes on twigs of blackthorn or sloe, often high up near the end of the branch, and at the angle formed by the separation of two twigs or a twig and a spine. They are globular in shape, somewhat flattened, and dead white in colour, contrasting sharply with the black bark on which they lie. The sculpture is very bold and consists of a large and deep central depression enclosing the micropyle, around which are arranged successive rings of small but deep pits, of which the first three or four rings outside the micropylar area appear to have the largest pits, and the shadows in these give an appearance of a darker ring around a central black spot. The average size is ·45mm. high and ·85mm. at the point of greatest width. To be found from August to April.

Zephyrus quercûs.—This ovum is similar to the foregoing in that it is laid about July or August, does not hatch before the following March or April, and has a stout opaque shell through which the colour changes of the contents are not visible. It is laid singly on terminal twigs of oak, at the base of next season's leaf bud usually, but also on the twig itself, if there is a convenient flat depression to hold it. Sometimes two or even more may be found on a twig where the insects are plentiful, possibly being laid by different parents. The egg is in shape a flattened spheroid, about ·5mm. high, and ·85mm. wide, dirty white in colour, with a central depression containing the micropyle and having the appearance of a dark spot. Around this are rings of pits which seem to have their edges irregularly drawn outwards, forming a *cheval de frise* of short spines, and giving the surface of the shell a very rough appearance.

Thecla w-album also lays an egg in the summer which will not hatch before the following spring, but it does not appear to be so thick-shelled as the two foregoing species. I have only once seen wild laid specimens, and in this case two ova had been deposited at the junction of two small twigs of elm, on the side facing the end of the shoot, and so close together as to slightly overlap. The shape is that of a deep saucer, or shallow basin, inverted, height

·35mm., and greatest diameter ·9mm. Shell comparatively smooth and brown, with a central micropylar depression surrounded by a paler coloured ring, and a light coloured fringe of short projections forming another ring round the base.

Lycæna argus (*agon*) is another stout-shelled egg, remaining as such from July to April. I have seen a single specimen laid wild near the tip of a shoot of heath, fixed to the stem between the bases of two leaves. They are, in colour, white with greenish shadows and not unlike a button in shape, being nearly flat both above and below; the maximum height is ·35mm. and width ·8mm. The micropyle is situated in a central depression on the top, and appears as a dark dot. The flat upper-surface around this for some distance outwards is pitted with tiny holes and is comparatively smooth, beyond which, bolder sculpture extends over the edge and down the sides of the shell in the form of rings of six-rayed star-shaped points, all the rays being inter-connected and leaving deep triangular pits in between.

Lycæna bellargus: I have seen this egg wild-laid on a shoot of *Hippocrepis comosa*, two being placed beneath a leaf towards the tip of the shoot and about a millimetre apart. They are to be found in June and again in September. In shape and colour the foregoing description of *agon* exactly applies, as also do the details of the sculpturing, so I will not repeat them; but the pits are larger and the six-rayed stars are consequently far fewer in number. In size the eggs appear to be slightly smaller, the specimens I measured scaling ·3mm. in maximum height, and ·65mm. in width.

Cyaniris argiolus: The ova of this species are to be found in May, deposited singly on the flower buds of holly; and they have been recorded also on those of dogwood, buckthorn, and spindle. Those I have found myself have all been of the later brood, and were laid in September on ivy buds; sometimes on the actual bud, at others on the stalk just below. I once found two ova side by side in this position. They are white with a green tint, circular in form and nearly flat at top and bottom. Height ·4mm. and greatest diameter ·65mm. The sculpturing is fine and superficially more theclid than lycænid in type. There is a central depression containing the micropyle, surrounded by a small ring of comparatively smooth shell, covered with tiny pits, and beyond this the usual arrangements of innumerable six-rayed star-shaped points, with triangular depressions between, continuing down to the base, and giving the whole egg an appearance of great roughness.

Nomiades arion.—Through the kindness of friends I have twice seen this ovum laid in nature. In both instances the egg had been deposited at the base of a floret on a head of wild thyme, and being white was somewhat conspicuous. They were sent to me in June, and hatched a few days later. The shape is quite lycænid, being a spheroid with upper and lower surfaces much flattened, the dimensions being height ·3mm. and greatest width ·65mm. The sculpture is very beautiful and of an exceedingly fine nature. The micropyle is situated at the bottom of a fairly large depression, with a comparatively smooth area around it, beyond which, so far as I can make out, the pattern consists of rings of four-rayed star-shaped prominences with more or less circular pits between the rays. These pits show a lovely green colour under magnification, if the specimen is not too near hatching.

Nemeobius lucina is an insect laying an egg of a type entirely different from any I have yet described, being very nearly globular, but with the base flattened and the surface of the shell smooth and shiny. In colour, pale, semi-transparent and greenish; they may be found in late May or June on the undersides of the lower leaves of cowslip plants growing in open glades amongst trees or bushes, and are usually in small batches of two or three up to as many as nine or ten on a leaf. The size is ·6mm. greatest height, and ·7mm. wide. The egg would be at once classed as an arctiid from its appearance alone. As is well known, the larval hairs are visible through the shell just before hatching, and appear as a dark network of comparatively large mesh, another point of similarity with many arctiid species of moths.

Adopæa thaumas.—The life-history of this species with details of oviposition has been so admirably described by Mr. F. W. Frohawk in the "Entomologist" for September, 1912, that it is really superfluous for me to refer to it, but for the sake of continuity and as a species which I have myself seen laid in the wild, I may perhaps be permitted to give my own observations. The eggs are oval in shape, flat on the upper and lower surfaces, and the measurements I took of them were:—greatest length 1mm., greatest width ·8mm., greatest height ·5mm. Colour, palest yellow with a tint of green and very slight roughness of shell, which was shiny or waxy in appearance. Four eggs were laid in a row up the centre and on the inside of a blade of grass, each being separated from the next by a space of just over two millimetres, and they were most accurately placed with their longer axes directed in the line of their arrangement. These were observed towards the end of August.

Smerinthus (*Amorpha*) *populi* lays a large pale green ovum, usually singly and on the underside of a leaf of poplar between the ribs, but it is far from unusual to find two, or even three, on the same leaf or on the upperside of the leaf. The time to look for them is May to July, and in shape they are oval and rather flattened on the top. Dimensions are, length 2·1mm., maximum width 1·6mm., and height 1·4mm. The surface of the shell is shiny and nearly smooth.

In searching for these eggs I have always found that very young poplars were the most productive, but possibly this is owing to their being more easy to work. I have taken over 50 eggs in less than an hour from a row of about 25 trees planted the year before, which could easily be bent down for closer examination of the leaves.

Sphinx ligustri ova I have found very occasionally on the underside of the leaves near the tip of the shoots of privet, laid singly. They are oval in shape, emerald green in colour, and seem to become rather colourless towards each end as they mature. The shell is nearly smooth and shiny, and the dimensions noted were, length 1·9mm., width 1·6mm., and height 1·4mm. All I have seen were observed in the month of July.

Macroglossa stellatarum: I have only once found these ova in the wild, and unfortunately they hatched before I got home, so that I am unable to give any detailed description or measurements as yet; but I observed the process of egg-laying, which was as follows:—On July 7th, when on holiday at Dunwich, I noticed a moth flying over *Galium verum*. She settled momentarily on a flowerhead with wings rapidly vibrating, and after curving her abdomen downward beneath her, darted off again almost instantly, flew round in a wide circuit, and returned to repeat the performance at another flower near. This she did five times in half-a-minute, almost at my feet, and each time I stooped and picked the flower the instant she left it. On examination I found a single globular pale green egg laid on the stalk below one of the florets, and most difficult to detect on account of its close resemblance to the unopened buds. These hatched indoors in a week, and the larvæ had fed up and gone down for pupation by August 9th.

Cerura bifida.—Ova laid singly on leaves of poplar and aspen in June and July. They are hemispherical in shape, and rest on a nearly flat base, being firmly cemented to the leaf. Colour brownish black all over, with a roughened shell. Size 1·3mm. diameter, and ·7mm. greatest height. Hatch in about a fortnight.

Cerura furcula.—I have only found these wild-laid after they had hatched out. They were always on the outer leaves of small sallow bushes, deposited singly, but very often more than one on the same leaf. In shape similar to *C. bifida*, but blacker, smoother of shell, and rather smaller in size, measuring only 1·1mm. in diameter, and ·6mm. high. The date was towards the end of July.

Dicranura vinula.—The eggs of the puss moth are probably by now familiar to most students of nature. They are so easily found in May, June and July on leaves of poplar, sallow and willow, appearing from below as conspicuous black dots of considerable size, and can be distinctly seen through the leaves in a good light.

Usually laid singly and firmly cemented to the surface of the leaf, the cement often forming an apparently dark ring round the base of the egg. Very frequently two eggs or even as many as five may be found on the same leaf, and when close together they have probably been laid by the same moth.

In shape they are hemispherical, with the base nearly flat, and the micropylar area apparently very slightly truncated outwards enclosing the micropyle in a sort of pit. Usually the colour is mahogany brown, the micropylar area, and the lower part of the base being much lighter in colour." Specimens have been found with the darker pigment absent, but these so far as I am aware, produced normal insects.

The shell is roughened, but has a glossy surface, and average measurements are 1·8mm. in diameter and 1mm. high.

Hatching usually commences between two and three weeks after the date of oviposition.

Pterostoma palpina: When looking for other ova in June, I have twice found a single egg of this species. One was laid on the underside of a poplar leaf, near but not on the mid-rib, and the other in a similar position on sallow, but on the upper surface of the leaf. Typically notodont in shape, it may be described as rather more than half of a sphere divided just below the middle, and resting firmly on the flat base. In colour, pale bluish-white, with a rather darker spot in the centre of the upperside, indicating the micropylar area, and a slightly glossy shell, which shows some amount of roughness, however, under a lens. Dimensions 1·15mm. diameter, and ·8mm. maximum height.

Phalera bucephala usually lays in large batches underneath the leaves of a number of trees of which lime, elm, oak, and sallow, are perhaps most frequently selected. I have counted 80 eggs in a batch, but should not expect this to be nearly the maximum number. One small batch of eight eggs I had under observation were all parasitized, and instead of producing larvæ, a number of very tiny black flies came out of a hole which was bitten out of the shell of each. I have never observed the eggs to be superimposed, but always arranged in one flat layer on the leaf. They are to be found in June. The shape is that of three-fourths of a sphere, and they rest on the flat base. Colour, dirty-whitish with a conspicuous black spot indicating the micropylar area, and all black from below a line drawn around at the widest diameter, the light and dark portions being thus very sharply separated, and marking the species as one easily identified. The size is 1·0mm. in diameter and ·85mm. high. They usually hatch between two and three weeks after being laid.

Asphalia diluta.—On December 27th, when searching oak-twigs for ova of *Zephyrus quercûs* with my friend, Dr. T. A. Chapman, we found several ova which proved to be this species. They were pushed in between the buds at the extreme end of the twigs, and were of a dirty-white colour, sculptured faintly with longitudinal ribs. The shape was oblong, squared at one end and rounded at the other, and flat at top and bottom. Dimensions, length 1·1mm., maximum width ·6mm., thickness ·4mm. These hatch out early in April.

Polyploca ridens.—I have never found the ova wild-laid, but some empty eggshells were lent me by Mr. R. M. Prideaux, which were placed at the base of winter buds of oak and affixed to the twig. The shape of the egg is rather oval and flattened, with well-marked longitudinal furrows. The approximate size is, length 1mm., width ·8mm., thickness ·6mm., but, unfortunately, I do not appear to have any note of the colour.

Orgyia antiqua: The apterous female of this species always lays her ova in a single layer batch on the outside of her cocoon, and these may be found in all sorts of places, such as under the coping of walls, on gate-posts, fences, tree-trunks, twigs, leaves, etc., throughout the winter. The egg is nearly globular, rather flattened on the top, enclosed within a stout opaque shell of a light stone colour. The micropylar area is marked by a rather large dark-coloured spot, and there is a ring of the same colour around the outside at the widest part of the shell. Within this ring, the surface of the shell is roughened with small pits, but below it is nearly smooth. Width ·85mm., height ·7mm.

Euproctis chrysorrhœa: The conspicuous egg batches of this species are to be found on sea buckthorn, in July and August, in the form of small bundles of brownish fluff wrapped around the twigs, the eggs being completely covered with hairs from her anal tuft by the parent insect. One of these bundles which I measured was $\frac{3}{4}$in. in length and over $\frac{1}{4}$in. thick. When removed from the protecting covering the ova will be found nearly globular, flattened at top and bottom, and honey yellow in colour, with a smooth shell. Diameter ·8mm., and thickness ·6mm.

Stilpnotia salicis lays her ova in small batches on the bark of poplars, enclosing them with some material having the appearance of hard white froth. Patches of this may often be seen $\frac{1}{2}$in. long and looking very conspicuous on the dark coloured bark. They should be obtainable in July. The actual ova are globular, flattened above and below, and olive-green in colour with a smooth shell. Diameter ·9mm., and thickness ·5mm.

Malacosoma neustria oviposits in a highly specialized manner, the ova being always found wild in the form of a ring or band about $\frac{3}{8}$ in. wide, encircling a small twig of hawthorn, sloe, plum, etc., where they remain all the winter. They are cemented together very firmly indeed, and can, with little trouble, be detached from the twig and slipped off entire; hence, no doubt, the rustic name of "fairy rings" which has been given to them. I have seen a batch around the stalk of a pear in a fruiterer's shop. The material used to unite the ova is dark brown in colour, and is most difficult to clear away for examination; but, so far as I can make out, the actual colour of the egg is a dirty white, with the micropylar area lighter than the sides. In shape, they are flattened ovoid bodies, with the micropylar end flattened. The shell is smooth, and has a central depression containing the micropyle, this appearing to be surrounded with a fine ring of darker colour. They are deposited standing on their tails so to speak, the side of one egg being fixed to that of the next, and all the micropylar ends, flattened and light-coloured, facing outwards. In size they are 1·2mm. long, ·8mm. wide, and ·7mm. in maximum thickness.

Eriogaster lanestris lays batches of eggs in March and April on the higher twigs of hawthorn and sloe bushes, covering them completely with slatey-brown hairs from her anal tuft. They are not placed in a compact mass, but often spread along and around the twig for nearly a couple of inches. When separated from the mass the ovum is found to be oval in shape, flattened on both sides, and pale brownish in colour, with a large dark patch on the side and a smooth shell. It is 1mm. long, ·8mm. wide, and ·6mm. thick.

Macrothylacia rubi: the ova are to be found in May and June in batches of a dozen or two, near the top of tall grass stems. They are large oval bodies with a nearly smooth shell, pale stone in colour, and having a dark brown spot at the end and a larger blotch on each side. This blotch is surrounded by a band of the same colour, and the two bands sometimes unite at the ends, forming a ring around the spot. Length 2·2mm., width 1·7mm., thickness 1·5mm.

Cosmotriche potatoria.—I have most frequently found these eggs in July and August in a straggling, untidy row of three to six, along the stem of an upstanding rush, and more than half-way up. In shape and arrangement of markings they are precisely similar to those of *M. rubi* just described; but the colour is whiter, the shell smoother, and the darker markings are of a sea-green colour instead of brown. Length 2mm., width 1·8mm., thickness 1·5mm.

Saturnia pavonia lays in a very similar manner to *M. rubi*, but I think the egg batches are usually larger and more neatly arranged, and the ova are distinctly smaller. When laid in a long cluster near the tip of a shoot of heather, they may easily be mistaken for the dead flowers of last season, with which they will probably be surrounded. I have found them in such situations during the month of May. They are oval with a nearly smooth shell, and pale brown in colour, with a *small* dark spot in the centre of the micropylar area, and a dark cloud surrounded by a broad band on each side; but these markings are much less constant and sharply defined than in the case of *M. rubi*. Length 1·8mm., width 1·4mm., thickness 1·2mm.

Spilosoma menthastri deposits her ova in neatly arranged batches of 50 or thereabouts, on the underside of a convenient leaf. They lie in regular rows, side by side, and are not usually superimposed. One batch found under a willow leaf at the end of June contained 45 ova. In colour they are greenish-white, nearly smooth, and with a rather shiny surface. Before they hatch they turn a dark slate colour. Shape spherical, with flat base and upright. The shell is thin and semi-transparent. Diameter ·8mm., height ·6mm.

Spilosoma lubricipeda.—I am unable to find any definite means of separating these from the ova of the preceding species, except that they seem to be a shade larger. They are deposited in similar fashion. A batch, found under a leaf of elder on July 24th, contained 60 ova. When about to hatch the head of the larva is visible through the shell as a dark spot, and the larval hairs as a dark outer ring. Diameter ·85mm., height ·6mm.

Arctia caja: ova precisely similar to *S. menthastri* in arrangement and situation; also similar in shape and colour. A batch found on August 4th, under a leaf low down on apple, contained 114 ova, which were semi-transparent, whitish, and had smooth and shiny shells, except under high magnification when fine reticulations were visible. Diameter 1mm., height ·8mm.

Hipocrita jacobææ deposits in batches under the leaves of ragwort, in a single layer, usually neatly arranged in rows side by side. One batch, found June 12th, contained 71 ova, another, on June 18th, contained five only and was placed in a kind of natural pocket near the mid-rib. They are pale yellow, smooth and shiny, globular in shape, flattened at the base. Diameter ·7mm., height, ·5mm.

Tryphæna pronuba lays her ova in enormous batches (I have counted over 1,000 in one batch) in all kinds of places. Probably she prefers a thin dead stem, as I have had batches on a tendril of passion flower, a grass stem, and the string of a tennis net, but others have been on a stout sorrel stem, a twig of a dead conifer, and the underside of a privet leaf. In the last-named instance the ova were most beautifully arranged in rows as close together as possible, only one layer deep, and almost entirely covered the leaf; but frequently the eggs are superimposed two and three deep in parts of the batch. They are very small for so large a parent, being but ·5mm. in diameter, and ·35 in height. When newly-laid they are pearly-white, but soon turn pale grey, and become dark purple brown before hatching. The shape may be taken as typically noctuid, hemispherical, upright, and with bold vertical ribs and horizontal rungs. Usually there are 36 ribs, of which alternately two unite and proceed up to the edge of the micropyle, and the third stops short, so that only twelve are carried over the top of the egg; but this number and arrangement varies considerably in individuals. They are to be found any time during July and August.

Barathra (*Mamestra*) *brassicæ* ova may be found in single layer batches on almost any garden plant, usually under the leaves. I have even seen a batch of 27 laid on a pea-pod; and can always get them in June by looking under the leaves of cabbages or cauliflowers. The egg is upright, hemispherical, flattened at base, and yellowish white in colour, developing a pale purple central blotch and outer irregular ring as it matures, finally turning almost black, just before the larva emerges. There are usually 38 bold vertical ribs, which are carried well up to the top before they unite in pairs, so that only about half the number extend up to the edge of the micropyle, and between these the hollows are divided up by many horizontal rungs. The diameter is ·65mm., and the height ·45mm.

Mamestra persicariæ.—Similiar in habit to *B. brassicæ*, a batch of about 50 ova was found on June 18th, on a gooseberry, and another on May 30th, under a leaf of *Lychnis dioica.* The ovum is similar in shape and markings tc that of *B. brassicæ*, but the number of vertical ribs is usually rather smaller, about 30 on the sides, of which fifteen are carried right up to the micropyle. The diameter is ·7mm. and the height ·5mm.

Dianthœcia capsincola.—I have found this ovum laid singly on the pistil of a flower of *Lychnis dioica.* It is upright, oval, and white in colour when fresh. The sculpture appears to be in the form of a fine network of raised hexagons of very small size, extending all over the shell. Length ·9mm., width ·75mm., thickness ·6mm. Altogether a most surprising ovum to be found amongst the *Noctuidæ.*

Dianthœcia cucubali: Ovum found in July and August, laid singly on buds and flowers of *Silene inflata.* Once on a leaf. Silvery-white when newly laid, yellow-brown later, and pale claret when mature. Nearly spherical, but flattened. Shell shiny, but under magnification it shows a very minute hexagonal network all over. Upright form. Length ·65mm., width ·5mm., thickness ·35mm. Almost as great a curiosity as that of *capsincola.*

Dianthœcia carpophaga: Singly on capsules of *Silene maritima*, in May and June. White when newly laid, later pale rosy-brown, and finally purplish. Hemispherical, with flattened base and 42 vertical ribs, bold and well defined, of which about half are carried right up to the micropyle. Form upright. Diameter ·65mm., height ·4mm. A remarkable contrast to those of *cucubali* and *capsincola.*

Pachetra leucophæa: Laid in large masses near the top of tall seeding grasses; sometimes on the seedhead. Time, early June. Opalescent greenish-white at first, they afterwards develop a central spot and outer ring of dark purple. Dark slate colour just before hatching. Upright form. Hemispherical in shape with flattened base. Sculpture, 44 vertical bold ribs, of which about half are carried right up to the micropyle. Well defined lateral rungs between. Diameter ·8mm., height ·5mm.

Miselia oxyacanthæ : Laid singly on twigs of hawthorn, some at base of side shoots, others on tip of thorns, October 23rd-30th. Upright conical, flattened at base. Pearly-white and rather shiny, with numerous blotches of pale purple. Eighteen bold vertical ribs, of which half stop short of the micropyle, and the others are carried up to the edge of it. Width ·8mm., height ·8mm.

Phlogophora meticulosa.—I have only once seen this egg laid wild. It was found by my little daughter on the upper-surface of a willow leaf, on June 19th, laid singly between the ribs. In confinement they may be obtained at almost any time of the year, and are then laid in larger batches. They are white at first, then yellowish with a blood red-ring and central blotches; and become slatey just before hatching. Upright and hemispherical, with a flattened base and bold sculpturing. Usually 36 vertical ribs begin from the base, and 14 of these stop abruptly before going very far up, eleven others are carried as far as the shoulder, and the remaining eleven continue up to the edge of the micropyle. The furrows between are occupied with numerous lateral rungs. Diameter ·75mm. height ·5mm.

Calamia lutosa.—I have seen the eggs of this species once only laid wild. There were seventeen altogether, in a straight row, just inside the sheathing leaf of a reed, the leaf being folded over and hiding them from view: September 2nd. The egg is upright globular, with flattened base and thin shelled; liable to be pressed out of shape by the pressure of the leaf. The colour is white, rather transparent and shiny, and there are about 50 faint vertical ribs. The micropyle is usually well marked. Diameter 1·1mm., and height .9mm.

Tæniocampa gothica : I once came across a female of this species when sallowing at the end of March, ovipositing on a dead flower-head of bramble. She had laid about 60 ova in an irregular mass, pushing them into all available crevices, and many being superimposed. They were, when found, of a greenish-white colour, and with a rather shiny surface, but in the course of a day or two developed a dark spot over the micropylar area and a somewhat indistinct dark ring around this at a little distance from it. Before hatching they darkened rapidly to slate colour. In shape they are upright spherical, and flattened at the base. Below the meridian the shell appears to be nearly smooth, but on the upper half there are about 48 well-defined vertical ribs, half of which terminate before reaching the micropylar area. Diameter ·75mm., height ·55mm.

Tæniocampa opima: These ova have been sent to me several times wild laid, in April and May, and always in a large irregular cluster near the tip of a young shoot of *Salix repens*, superimposed in places to a depth of 3 or 4, so as to fill up the interstices between the leaves; probably 200 or 300 eggs in a batch is quite a usual number. In shape and sculpture they are similar to those of *T. gothica*, but smaller, being only ·55mm. in diameter and ·35mm. high; and in those I have examined the average number of vertical ribs has been rather less, that is to say 44. I have not seen any in a freshly laid state, but when mature, the colour is pale purplish, and later dark slatey grey.

Tæniocampa gracilis I have found very frequently in early May, always tucked away on a dead knapweed head, and though very few may be apparent superficially, quite a large number will be found if the seed vessel is carefully pulled to pieces. The moths seem to prefer those plants which are standing in rides and open spaces in woods. The egg is globular, flattened, and somewhat shiny. Shell thin, and very faintly sculptured on the upper half with about 50 vertical ribs. The base is smooth or nearly so. In colour, it is white when newly laid, and pale yellow or brownish later, turning dark as usual before hatching. Diameter, ·6mm., and height ·4mm.

Calymnia affinis.—Two eggs laid on the bark of a small elm-twig, partly superimposed, and with no suggestion of being hidden away in any sort of crevice, produced this species. Pale lemon-yellow in colour, upright, and with 36 vertical ribs. The sculpturing is rather shallow. In shape they were nearly spherical, but rather flattened below. Diameter ·55mm., height ·45mm.

Cirrhœdia xerampelina.—These ova, so far as I am aware, are laid singly at the base of a winter bud of ash; sometimes two on a twig, and occasionally on the bud itself. They are invariably partially covered with parental hair-scales. The ovum is upright, hemispherical, rather flattened, and has bold and well-defined sculpture. This takes the form of 21 vertical ribs, of which ten stop just over the shoulder, so to speak, and the remainder are carried up to the micropyle. Between these ribs are numerous lateral rungs. The colour is at first pale yellowish-white, becoming deep purplish-brown when matured. They appear to hatch just before Christmas. Diameter ·75mm., and height ·4mm.

Cirrhia citrago oviposits singly on twigs of lime towards the end of the branches, and usually on a leaf-scar just below a bud; sometimes two or three on a twig. There they remain throughout the winter, and are not difficult to find if carefully searched for. They are upright, hemispherical, and pale purplish-brown in colour, becoming much darker as they mature. The sculpturing is very bold and simple. A small depression in the centre contains the micropyle, and twelve well-defined vertical ribs are carried right up to this from the base. These ribs appear to be rather lighter in colour than the body of the egg itself. Diameter ·75mm., and height ·5mm.

Ochria aurago.—I have seen this egg once wild laid singly on a leaf-scar, near the tip of a beech twig. In shape it is similar to that of *C. citrago*, but has fourteen or fifteen vertical ribs, and six or seven of these (individuals vary) stop a little before the rest. Between the ribs are many lateral rungs. Colour purplish-brown, and rather shiny, with the raised parts of the sculpturing distinctly lighter. Diameter ·75mm., height ·5mm.

Xanthia fulvago may be found laid singly at the base of buds of sallow, or between the bud and stem; frequently several on the same twig. They are similar in shape to those of *C. citrago*, but have many more vertical ribs. The number of these varies between 28 and 30, so far as I have observed, and about half of them are perceptibly shorter than the others. Colour, pale purplish-red, darkening with maturity till they appear to match the surrounding bark. Diameter ·65mm., height ·4mm.

Cucullia verbasci.—I have found these ova, early in June, laid singly on buds, stalk, and base of young leaves of mullein. They are upright, hemispherical, and pale greenish-white in colour, developing brown spots, scattered apparently at random, over the surface of the shell. The sculpture is not very bold, and consists of 30 vertical ribs, which unite before reaching the micropylar area, only fifteen being carried right up. The diameter is ·8mm. and the height ·5mm.

Plusia moneta.—I have only found these in July, laid singly on the flowers and calyces of monkshood. They are upright, hemisperical, and pale orange-red in colour, developing a dark central blotch, and becoming deep purplish just before hatching. The sculpture is moderately bold, and consists of 28 vertical ribs with lateral rungs between, and a well defined micropyle. Of the vertical ribs ten are short, twelve more unite in pairs a little further up, continuing as six, and only twelve eventually reach the micropylar area. Diameter ·7mm., height ·45mm.

Nemoria viridata.—The late Dr. Hodgson supplied me with wild laid ova of this insect. They were deposited singly on the leaves of petty whin and ling in June. The egg is oval in shape, nearly flat on both sides, and pale green in colour. The shell appears to be smooth and shiny; and the dimensions are ·6mm. long, ·4mm. greatest diameter, ·3mm. thick.

Thera juniperata.—I found an ovum of this species in February, near the base of a juniper leaf, on the upper surface, and partly covered by the natural curling inwards of the sides of the leaf. It is opalescent greenish in colour, oval in shape, and flattened above and below. The sculpture is not bold, and takes the form of a network of minute hexagons all over the shell. Length ·65mm., width (maximum) ·5mm., thickness ·35mm.

Coremia unidentaria.—For this species laid wild I am indebted to Dr. T. A. Chapman, who found an example in May near the extreme tip of a blade of grass, on the upper surface, and fixed slightly across the line of growth. It was oval, flattened above and below, and tapered considerably towards one end. The colour was pale yellowish-white, and the sculpture consisted of small hexagonal depressions all over the shell. Length ·65mm., maximum width ·5mm., maximum thickness ·4mm.

Perizoma albulata.—Of this species I have but once seen the ovum in nature. It was then laid singly on the calyx of a flower of yellow rattle, and was very effectually hidden by the long plant hairs with which it was surrounded. It is oval in shape, slightly flattened above and below, of a yellow colour, and has a large number of shallow pits spread over the surface of the shell. Length ·55mm., width ·4mm., thickness ·3mm.

Eupithecia venosata.—I found these commonly when looking for ova of *cucubali*, laid singly on the flower-buds of *Silene inflata*, both in May and July. They are oval, much flattened above and below, yellowish-white at first, and purple-black just before hatching. The shell, which has an appearance of semi-transparency, is ornamented all over with minute pits. Length ·6mm., width ·45mm., thickness ·2mm.

Ennomos fuscantaria.—I have seen 24 of these curious brick-shaped eggs laid in an irregular row along an ash twig. They were placed side by side, touching each other, excepting where the inequalities of the surface caused a slight separation. The shape is rectangular and flat, and the colour dark greenish-black with an opalescent appearance. The surface of the shell is very slightly reticulated, excepting at the micropylar end. Here there is a large oval depression, surrounded by a whitish raised ring, of which the edge is serrated. The opposite end is flatter, and has a less perfected pale ring without notches. Length 1·0mm., width ·5mm., and thickness (maximum) ·3mm.

Ennomos quercinaria has a most characteristic type of ovum, resembling, so far as I know, that of *E. autumnaria* only amongst all our British Lepidoptera. I have never seen it in the wild myself; but I had a piece of bark sent me which had been cut off a poplar-tree, and was studded all over with the eggs to the number of over 100 to the square inch. In colour, dark-green and somewhat shiny, with a pale brown ring around the micropylar area, and very slight pitting on the surface of the shell. The shape is oval, rather flattened above and below, and with the micropylar end cut off square. Length ·8mm., maximum width ·6mm., and thickness ·4mm.

Himera pennaria.—I disturbed a female of this species in the New Forest, early in November, which was ovipositing on honeysuckle. She had laid seven eggs in the angle below a twig. These were standing closely together in a small batch. But I have seen a twig of ash gathered wild on which some 250 eggs had been laid in eleven long straight rows, as closely and evenly together as possible. In shape the egg is approximately cylindrical, with flattened ends, nearly smooth and rather shiny. When fresh laid it is opalescent greenish-yellow, but soon becomes pale olive-green. *H. pennaria* is one of the few species amongst our British geometrid moths which lay an upright egg. The diameter is ·65mm., and the height 1mm. The micropyle is quite distinct under low magnification, and is situated in a tiny pit in the centre of the flat top.

Crocallis elinguaria deposits her curious, large, brick-shaped eggs in a long straight row, side by side, along a twig of sloe, or other of its very numerous food-plants. I have found a batch of 35 on privet, and another on sloe containing 22 eggs. They are to be found throughout the winter, and as they undergo little change in colour, I presume the shell is thick and opaque. The colour is dirty whitish with blotches of two shades of brownish-grey, the larger and darker marks being more numerous towards one end, and forming an indistinct bar or fascia. Type flat. Corners rounded, and surface of shell very slightly pitted. 1·1mm. long, ·7mm. wide, and ·3mm. thick.

Ourapteryx sambucaria lays in small batches under leaves of ivy, etc. I have found a small batch of four under a leaf of clematis. They are like the eggs of no other geometrid moth I have yet met with. Upright, shaped rather like a wide barrel, with thirteen well-marked vertical ribs, which are carried right up to the outer edge of the micropylar area, and with numerous faint lateral rungs between. The micropylar area is smooth, somewhat bulging, and occupies the whole of the top of the egg. Colour pale yellow. Maximum diameter ·65mm., and height ·8mm.

Apisthograptis luteolata lays small batches on leaves and twigs of hawthorn, etc., sometimes in a row side by side. I have one batch of thirteen laid on the bye-pass key of a street lamp. They are broadly oval in shape, inclining to be rectangular, flattened, and with the shell covered with minute pits. The colour is pale yellow, and red spots or blotches develop irregularly over the surface soon after being laid, if the eggs are fertile. Found in May and June. Length ·7mm., width ·5mm., and thickness ·35mm.

Anisopteryx ascularia.—I have several times come across the curious egg-batches of this insect on hawthorn and sloe bushes when searching for larvæ in March and April. They are neatly arranged in rows, closely packed together round the twig, and are carefully covered over with hairs from the anal tuft of the parent. As they appear to be attached to each other end to end, and to the twig by one side, they must be classed as flat eggs. The shape is spherical, slightly flattened at the ends, and with little or no sculpturing on the shell. Colour, golden brown. Diameter ·6mm. and thickness ·5mm.

Nyssia zonaria.—The only wild laid eggs of this species I have had for examination were laid in a batch, down inside the fold of a withered grass shoot. They were tucked away into the space available, with no appearance of arrangement or order, and numbered 35 in all. They were found in April. The egg is of the flat type, oval in shape, and rather wider than its thickness. The colour is pale green, darkening somewhat as development proceeds. The surface of the shell is rough, being evenly pitted all over. Size ·9mm. long, ·6mm. wide, and ·5mm. thick.

Ematurga atomaria.—I have found these ova in June, on dead flowers of heather, often in small batches, several eggs being tucked away inside one floret. They are flat, oval, rather tapering towards one end, and have a roughened shell due to sculpturing in the form of longitudinal rows of small pits all over. Colour yellowish-green. Length ·65mm., maximum width ·4mm., and thickness ·35mm.

Trochilium crabroniformis.—I once found a small batch of eleven eggs of this species on the bark of a poplar-tree. They were laid in two groups of six and five respectively, in adjoining crevices. As the egg of this species differs materially from that of *T. apiformis* I have no doubt as to their being those of *T. crabroniformis.* They are flat, oval, and have a roughened surface to the shell, and the colour is rather light ochreous-brown. Length 1·15mm., maximum width ·75mm., thickness ·4mm.

Sesia tipuliformis.—I am indebted to Mr. L. W. Newman for the only wild laid example of the egg of this species I have seen so far. It was deposited singly, in a groove on the side of a currant twig, some way below the base of a leaf stalk. Flat, oval, and with longitudinal rows of pits on the surface of the shell, which was dark brown or blackish in colour. Length ·4mm., width ·2mm., and thickness ·12mm.

The time has now come for me to perform the pleasant duty of vacating the chair in favour of my successor, Mr. B. H. Smith, in whose capable hands you have so wisely placed the future conduct of our Society, and to tender my sincere thanks both to the members in general, and to the officers and Council in particular, for their very generous support and assistance during my two years' presidency.

ABSTRACT OF PROCEEDINGS.

FEBRUARY 13th, 1913.

The *President*, Mr. A. E. Tonge, F.E.S., in the chair.

Mr. Chas. R. Wixey, of Palmer's Green, N., was elected a member.

It was announced that the Council had chosen Mr. E. Step to fill the office of Hon. Editor, and Messrs. J. Platt-Barrett and D. N. Riley to be the additional members of the Council, in accordance with the alterations made in the Bye-Laws at the Special Meeting, held on January 23rd (Proceedings, 1912-13, page 138).

Mr. A. W. Buckstone exhibited the following aberrations of *Charaas graminis:* 1. A male, inclining to grey on both fore- and hindwings, the usual markings being scarcely discernible. 2. A pale dwarfed male. 3. A male with left wing dwarfed. 4. A dark grey female inclining to black. 5. A grey female inclining to pink. All were taken in Richmond Park, Surrey. He also showed a female *Agriades thetis* (*bellargus*), with right hindwing dwarfed, the usual spots on the underside being absent. It was taken at Dorking in September, 1912.

Syntomids from Central America.—Mr. A. E. Gibbs exhibited a drawer containing a number of moths, principally belonging to the *Syntomidæ.* He explained that his friend and correspondent, Dr. F. L. Davis, F.E.S., of Belize, British Honduras, made an excursion in June, 1912, to a place called Castile, on the Old River, for the purpose of investigating the entomology of that part of the interior of the Colony. So far as the butterflies were concerned, the visit did not prove a particularly successful one, but the abundance of syntomid moths which he found on the blossoms of the shrubs on the borders of the forest made amends for the lack of larger lepidoptera. It is well known that among these insects some remarkable instances of mimicry are to be found, and Mr. Gibbs exhibited a number of species which resembled very closely the aculeates and diptera which were found haunting the same flower heads. So closely, indeed, was the likeness between the insects of the two Orders, that Dr. Davis, experienced entomologist as he is, made mistakes, and was stung by hymenoptera which he handled in mistake for moths. The well-known *Cemycles autterocina*, which is a very close mimic of a wasp, was shown, and also several syntomids of much greater scarcity, among them being a species of *Loscophlebia*, which was new to science, and which the exhibitor had described and named* *L. davisi*, in honour of its captor. Several species of *Matrocneme* were included in the collection, as well as some showy *Arctiadæ* and insects belonging to other Orders.

Mr. W. West (Greenwich), exhibited six species of the coleopterous genus *Ophonus* (*Harpalus* in part), with the ædœagus mounted by the side of the males. Since the publication ("Trans. Ent. Soc. Lond.," 1912, pp. 477-642) of Messrs. D. Sharp and T. Muir's paper on the Comparative Anatomy of the male genital tube in Coleoptera the differentiation of closely allied species had been greatly facilitated, and species that had been considered common have been proved rare, and *vice-versa*. The species exhibited were *O. brevicollis*, *O. rufibarbis*, *O. cordatus*, *O. rupicola*, *O. parallelus* and *O. azureus*.

Mr. H. W. Andrews exhibited a series of both sexes of the dipteron, *Hæmatobia irritans*, L., taken off some bullocks, near Milford Haven, in July, 1912. He first noticed these flies clustering in a dense ring at the base of the bullocks' horns. Mr. Frohawk had noticed similar clusters on the horns of bullocks in marshes in the eastern counties.

Mr. K. G. Blair exhibited a large living larva of a species of *Geotrupes* (Dung beetle). The larva resembled that of *Melolontha vulgaris* in general appearance, but the ventral surface was flatter, and more particularly the third pair of legs was rudimentary, and, so far as is known, quite functionless.

Mr. A. E. Tonge exhibited a series of *Epunda lichenea*, bred from fifteen ova laid by a female captured at Eastbourne, in October, 1912. These produced an equal number of full-sized imagines with practically no variation. They consisted of nine males and six females.

Mr. Coote exhibited bred examples of *Papilio machaon*. One specimen was remarkable as being very much darker in the ground colour than is characteristic of the British race. It was pointed out that there was a race existing in the Rhone valley, in which the ground colour was deep yellow, and known as var. *aurantiaca*: and that the habit of the species on the continent, where it persistently frequented the summits, such as the Rigi, Burgenstock, Riffilalp, etc., was very different from its habit in this country, where its habitat is restricted to the more extensive marsh-land of the eastern counties.

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* "*Proc. Ent. Soc. Lond.*" 1913, iii.

Mr. F. W. Frohawk exhibited several varieties of *Melitæa athalia*, *M. aurinia* and *M. cinxia*. Among these was a melanic var. of *M. athalia*, captured at Chattenden, in 1866, by the late T. W. Wood. Another was *M. athalia* ab. *eos*, captured by himself, on June 23rd, 1907, and described and figured in "The Entom.," vol. xl, 1907, p. 193. The ab. is similar to one captured at Peckham, in 1803, which was figured in Stephens' "Illustrations of Brit. Entom.," vol. i., 1828, and copied in Westwood's "Brit. Butts.," 1841. It was again figured in "The Entom." 36 years ago, and made several appearances at Stevens' Auction Rooms, the last time on March 27th, 1900. The specimen exhibited was a more perfect and very beautiful example of this aberration, being further removed from typical *athalia*; but in other respects it was almost identical with the Peckham capture. A *M. aurinia* male, wtth aberrational upperside, bred June 3rd, 1905, from the eggs of a Walmer Forest parent, and a female of the same species with aberrational underside, bred June 17th, 1893, from a larva found at Penarth. This example was figured and described in "The Entom.," January, 1894. Five undersides of *M. cinxia*, including a male with asymmetrical pattern, the median pale band of the hindwings being spotted on one side and plain on the other, and other markings were also dissimilar; three other examples were heavily spotted, and in one some of the basal marks were missing and so constituting a light variety.

Mr. Frohawk also showed a series of nine drawings in colour of choice varieties, among them albino *Argynnis adippe*, albino *Euchloë cardamines*, melanic *Brenthis selene*, and a curiously asymmetrical *Pieris rapæ*, in which the usual black markings were almost wanting on the right forewing, whilst they were well developed on the left.

Mr. A. W. Buckstone reported that in breeding *Phigalia pedaria* he had found a male paired with a female within five minutes of emergence, and before the wings were expanded. Mr. Sich remarked that he had similar experience of silkworm moths (*Bombyx mori*) pairing immediately after emergence from the pupæ.

The remainder of the evening was devoted to an exhibition of objects under the microscope.

Mr. C. B. Williams exhibited an example of the order *Protura*, primitive insects recently discovered on the continent, and just recorded for England, specimens having been taken last year by Mr. Bagnall.

Mr. R. Adkin showed under the microscope some of the smallest species of lepidoptera, including *Lithocolletis lantella*, *L. vacciniella*, *Nepticula fulgens*, *N. weaveri* and *N. aurella*; and called attention to the great beauty of these minute creatures.

Mr. Ashdown exhibited small species of coleoptera, and also some crystals under polarised light.

Mr. Clark exhibited some curious bacteria.

FEBRUARY 27*th*, 1913.

There was an exhibition of lantern slides.

Mr. W. J. Lucas exhibited slides of various parts of the New Forest visited by entomologists; Newlands Corner, Surrey; the large old elm on Abrook Common (recently removed), and a photo of Mr. Lyle, of Brockenhurst.

Mr. C. W. Colthrup exhibited slides of *Hadena oleracea* larva, *Saturnia pavonia* at rest, *Lasiocampa quercus* at rest, *Dicranura vinula* at rest, Herring Gulls (*Larus argentatus*) following in the wake of a ship, and a study of the long-tailed tit (*Acredula caudata*).

Mr. Grosvenor exhibited a series of slides showing various aspects of Colley Hill, Reigate, which has been acquired recently by the National Trust, and slides illustrating the variation in *Pieris rapa*, *Brenthis selene*, *B. euphrosyne*, *Melitæa aurinia*, and in several species of the *Anthroceridæ*.

Mr. Dennis exhibited several slides of plant studies.

Mr. W. J. Kaye exhibited the orchid *Sophronitis grandiflora*, a native of the Organ Mountains, South Brazil. The flowers were exceptionally well-developed.

Mr. A. E. Gibbs exhibited a number of butterflies taken by him in the Balkans in 1912, and contributed the following note:—

"The *Pieridæ* exhibited were taken during my journey in Dalmatia, Bosnia, Herzegovina and Montenegro during the summer of 1912.

"*Pieris manni*, Mayer.—This species has a very close resemblance to *P. rapæ*. It has, however, the apical blotch differently shaped and larger. It is more crescentic in outline, and extends some distance down the outer margin. The discal spot is differently outlined, its margins generally being more concave, and there are often black streaks running from it to the outer margin. The wings are generally rounder in outline. In the spring form *manni*, Mayer, the apex and spots are grey, but in the summer form, *rossi*, Stefa, they are black and altogether more prominent. It is a South European species.

"*Pieris ergane*, Hbn., may be at once distinguished by its unspotted underside. I found it abundant in most of the districts I visited. I took a long series, including Kostagno's female aberration *magnimaculata*, in which the black spots on the upper side are much enlarged, and *longimaculata*, in which they are more or less united, and form a cloudy band from costa to inner margin of forewing. I also have specimens of, or very near to, his male aberration, *semimaculata*, in which the spots disappear, leaving only the dark apical blotch on the upper-side of the forewing. In my specimens the spots are faintly represented by obscure points.

"*Anthocaris belia* var. *ausonia* I found abundantly in many places; they were especially abundant in an old Turkish cemetery at Podgorita in Montenegro. The white spots on the underside of the hindwings appear to me to be rather large and to resemble the Italian form known as (?) *romana*.

"There is also a male specimen of *Pontia* (*Leucochlöe*) *daplidice*, rather large and with the underside markings of a greyer green than most of my specimens.

"Of *Leptosia sinapis* I have three forms. There are examples of the first brood *lathyri* quite normal, with greenish-grey markings on the underside of the hindwing; of the summer form known as *diniensis*, with very dark apical spots on the forewing above and practically without markings below. I also took a female of the summer form known as *erysimi*, which is quite immaculate on both the upper and under surfaces.

"*Colias edusa*.—There is a fine large female, 53mm. in expanse, taken at Jajce, in Bosnia, which I think is rather striking, the orange spots in the marginal band being unusually large and conspicuous.

"A male *Colias hyale* has the black apex much extended, and its yellow spot almost obliterated, the discal spot being very close to it and united with it by black rays."

Mr. C. W. Colthrup exhibited a specimen of *Vanessa io* taken hibernating in a room at Dulwich.

Mr. Tonge exhibited a specimen of *Sphinx ligustri* in which the usual pink areas of the wings were extremely pale, almost white.

Mr. Hy. J. Turner exhibited an aberration of *Melitæa didyma*, taken at Zermatt, in which the greater number of the black markings on all the wings were of a very faint slate colour; also a number of females including one of extremely dark ground colour from the Sarnthal, Tyrol.

Mr. Frohawk exhibited some unusually large specimens of *Lampides bæticus* which he had bred from ova, the larvæ having been fed on green peas. The white on the under-surface was also very well accentuated.

Mr. Frohawk also exhibited a semi-albino example of the woodcock (*Scolopax rusticula*) sent to him from Ireland, and said that the plumage of male and female specimens was absolutely identical. He then showed a drawing of an albino specimen of the great snipe (*Galinago major*) from Cambridge, and several very clever pencil sketches of protective resting habits of lepidoptera.

Mr. R. South exhibited long series of five successive generations of *Acidalia virgularia*, Hüb., originating from ova laid by a female captured at Bishop Auckland on August 7th, 1910, and communicated the following details:—

"The ova were deposited on August 8th, 1910, and hatched on August 15th. The larvæ fed readily on knot-grass, but during the winter they were supplied with dandelion, and in the spring they were fed up on the same plant.

"1st generation.—26 moths were bred during May and June, 1911. On June 4th and June 9th ova were laid. The larvæ produced were fed up on dandelion.

"2nd generation.—Over 60 moths were reared in July and August, 1911, and were of the small summer form. On July 29th ova were deposited, which hatched on August 6th. Again dandelion was selected as the food.

"3rd generation.—About 30 moths were reared during September and October, mostly of the small summer form, but the seven moths last to emerge were of the large Spring form. Many larvæ of this brood hibernated, and after feeding up in the early spring the moths appeared in April and May, 1912, all of the spring form.

"4th generation.—The larvæ, which hatched from the ova deposited by the moths which emerged in September, hibernated quite small, and were fed up by May 30th, 1912. On June 12th the moths began to appear, and over 200 emerged, all of them large specimens, ranging from 20mm. to 30mm. in expanse.

"5th generation.—Two pairs of the 4th generation moths were removed from the breeding cage, and the females deposited ova. The larvæ from these ova fed through July and part of August on dandelion and knotgrass. Some attained the imago stage in late August and early October, 1912, and were of the summer form, others are now in hibernation, together with some larvæ of a sixth generation."

MARCH 13*th*, 1913.

Mrs. A. E. Gibbs, of St. Albans, and Messrs. Geo. Brooks and Gilbert Storey, of the British Museum (Nat. Hist.) were elected members.

Mr. Colthrup exhibited a number of excellent photographs of collecting localities in the New Forest, in Surrey, etc., and of the resting attitudes of species of the genera *Tephrosia* and *Boarmia*, showing striking protective resemblance.

Mr. C. B. Williams exhibited the larvæ of two species of the snake-fly, *Rhaphidia*, *R. maculicollis* and *R. notata*. He fed them upon aphides, which they ate readily, and supplied them with water. The larvæ were obtained at Oxshott, where they were not uncommon in decaying pine stumps.

Mr. Platt Barrett exhibited specimens of the true *Thera variata*, sent to him by Major Robertson from the New Forest, and asked if the species was to be found in the London district. He pointed out that the larvæ fed exclusively on spruce. He also showed *T. obeliscata* for comparison.

Mr. Gough exhibited the egg of a blackbird (*Turdus merula*) in which the dark markings were massed at the larger end.

Mr. A. E. Gibbs exhibited a number of species of *Satyridæ* and *Hesperiidæ* taken by him during his holiday in the Balkans, and contributed the following notes:—

"One of the most characteristic butterflies of Dalmatia is the form of *Melanargia larissa* to which Hübner gave the varietal name of *herta*. It is a much whiter insect than the nymotypical form, which occurs in the eastern Balkans, while var. *herta* is found in the west of the peninsula. I did not spend a great deal of time in Dalmatia, and could only devote two or three days to field work, but I took a short series of this butterfly, and saw a great many more from the train. Var. *herta* flies on the grassy hillsides among the dwarf bushes in company with *Polyommatus escheri*. When I was at Spalato in the early days of June, 1912, they were in a very nice condition, and had evidently recently emerged.

"I also got some nice dark forms of *Melanargia galatea*, and I have brought some specimens for exhibition. The series is headed by a couple of British *M. galatea*, which are so familiar to all of us. Our form is small and lightly marked compared with those from the South of Europe. In England *M. galatea* reaches the northern limit of its range in western Europe, and the northern and central continental forms are practically the same as ours, as will be noticed in the short series I show from the Vosges, while, as many of you know, the specimen from Éclepens and other Swiss localities resemble them very closely. But when we get south of the Alps the insect puts on a different appearance, and we get the more melanic form which is known as var. *procida*. The specimens I show from the neighbourhood of Turin exhibit very distinctly this increase in the black markings and the reduction of the white. It will be noticed that the white spots in the black marginal band of the hindwing show a tendency to disappear. The next series is from the Aurunci Mountains in south-central Italy, and it is curious to note that, contrary to the general tendency, the more southern Italian specimens are less heavily marked with black than those from Piedmont. The next row consists of Balkan specimens taken last summer, and here we have a fine dark form of *M. galatea*. The blackest specimens from this district are called var. *turcica*, Boisd., but it seems difficult to tell where var. *procida* leaves off and where var. *turcica* begins, and I do not think a hard and fast line can be drawn between them, and, indeed, we can get a fairly complete gradation between the small and light northern forms, and the larger and darker southern ones. You will notice the extremely melanic specimen at the bottom of the row.

"I took some of the largest specimens I have yet met with of *Satyrus semele* on the arid mountain slopes of Montenegro and the Hercegovina. Some of the females have an expanse of 61mm., and are fine brightly-coloured specimens with well-marked undersides, the white central band of the hindwing contrasting vividly with the darker basal and distal areas. I have put in three British specimens for comparison. Of *Satyrus hermione* I need say very little, except to remind you of its habit of settling on the tree trunks. I came upon a colony of them at Jablanica in the Hercegovina. I was exploring a rocky and desolate valley, following a narrow track high up on the outside of it. It was quite devoid of shade, but right up on the top of the divide there was a belt of small timber. I climbed up to it to look over into the next valley, and when I reached the trees I found *S. hermione* in considerable numbers sitting on the trunks, and flying from one tree to another when disturbed. When settled it was not easy to see them, and they required careful stalking.

"I have also brought a few specimens of *Pararge mæra*, form *adrasta*. I may call attention to the third specimen, a small female, of the aberration known I believe as ab. *bipupillata*. You will notice the apical ocellus encloses two white spots, and there is another small well-defined ocellus above it and a distinct black spot in the interneural space below. The hindwing has a row of six submarginal spots.

"One of the most interesting insects I met with, and one which at first sight puzzled me, was a variety of *Cœnonympha tiphon*. It is the var. *rhodopensis* of Elwes, and somewhat resembles our northern form, the var. *scotica* of Staudinger, which is often confounded with the var. *laidion* of Borkhausen. In var. *rhodopensis* there are no ocelli on the upperside, but in some of my specimens the apical spot on the underside shows through. The colour is very near that of *C. pamphilus*. They are nearly unicolorous, but in the males the hindwings are darker, as also are the veins and costal and outer margins. Below, the forewings, except for their ashy-grey apices and margins, are generally without markings, but I have one or two specimens which show a trace of the white transverse band. Dr. Seitz says that the hindwing of vars. *rhodopensis* below mostly shows a complete row of ocelli, but in this respect the insect is variable, some of the females having the full number of six rather conspicuous ocelli, while, in most of them, the spots are very feebly developed, and in one male from Montenegro they are entirely absent. This latter form has been named by Dr. Rebel ab. *occupata*.

"I also show three hesperiid species—*Pamphila lefebvrii*, two Dalmatian specimens, and for comparison two others sent me by Signor Querci, from Formia, in the Italian province of Caserta. There are short series of *Hesperia sidæ*, a southern species which may, at once, be distinguished by the orange bands on the underside; and of *Pyrgus orbifer* from Cettinge."

Mr. Robert Adkin exhibited a series of *Tinea pallescentella*, reared from larvæ feeding in hare's hair received from Brandon, Suffolk: also some of the cocoons and pupa-skins from which they had emerged, together with specimens captured in the City of London, at Lewisham and at Eastbourne. He then read a short paper on the history and life-history of the species (p. 1).

In the discussion which followed, Mr. Porritt mentioned that he had taken *T. pallescentella*, with several other species of *Tinea*, from old sheep's wool in the Huddersfield warehouses; and Mr. Sich said that he had several times taken the species at Chiswick, also that it had sometimes occurred in circumstances that might lead one to suppose that the larvæ had been granivorous.

MARCH 27*th*, 1913.

Mr. B. H. Smith presented two specimens of *Phryxus livornica* to the collections.

Mr. Colthrup exhibited a further series of photographs taken by himself of insects at rest, and of the eggs of shore birds in nature.

Mr. A. E. Gibbs exhibited a number of Nymphalids, especially of the genera *Argynnis* and *Melitæa*, taken by him in the Balkans in the early summer of 1912, and communicated the following notes:—

"NYMPHALIDS FROM THE BALKANS.—For my exhibit to-night I have put together specimens of all the Argynnid species I took in the Balkans last summer, and I am able to show you seventeen species, as well as several varieties and aberrations. Many of them are perfectly familiar, the majority of the species being common European insects, and several are found in the British Isles. There is first of all the largest European "fritillary," *Dryas pandora*, the specimens I brought home being from Mostar, in the Hercegovina, where it is apparently rather common. Its congener, *D. paphia*, I saw in many places, but the only specimen I appear to have captured comes from Jablanica, in the same province, at which place I also found *Argynnis adippe* not uncommonly, there being among them a good proportion of var. *cleodoxa*, in which the silver is absent from the underside of the hindwings. *A. aglaia* was less common, and the same remark applies to *A. niobe* var. *eris*, one specimen of the latter insect taken at Mostar being, I think, unusually large. *Issoria lathonia* was a butterfly often met with; I found plenty of them on the hills around Cettinge. *Brenthis euphrosyne* I saw only in one place, a solitary female occurring at Cettinge on June 9th, but the species was evidently over at that date. An insect which I was pleased to get was *B. hecate*, which appears to be rare. I only caught two specimens, a male taken at Jajce, in Bosnia, on July 4th, and a female at Jablanica, in the Herzegovina, on June 18th. The latter was flying over some flowers of the dwarf elder, by the side of the road in the Narenta valley. These blossoms seemed particularly attractive to *B. daphne*, of which I took a good series, as well as of *Chrysophanus alciphron* (type), in good condition. When I returned to Jablanica, on July 8th, both species were worn to rags. *B. dia* I occasionally saw, but seldom troubled to take. *B. amathusia* I discovered in one spot only, and that was at Cajnica, where it was flying in some numbers in a hillside graveyard, where the grass was uncut and wild flowers abounded, and where I found growing the largest and most luscious wild strawberries it was ever my lot to come upon. Of the melitæids *Melitæa phœbe* was a fairly abundant and wide-spread species. *M. trivia* I only found twice—one at Cajnica and one at Jajce. *M. didyma* occurred in all the countries visited, but I find that I only brought home males. I suppose we should call some of them var. *meridionalis*. But the most abundant argynnid species, in point of numbers of individual specimens seen, was *M. athalia* var. *mehadiensis*. I did not find it in Montenegro, but probably it had not emerged when I was in that country, my first capture being at Gorazda, on the eastern frontier of Bosnia, on June 23rd, and after that date it appeared in swarms, especially in the more northern localities in which I collected. A fine melanic form (ab. *navarina*) was captured near Jajce. *M. dictynna* occurred at Illije and Travnik. Of *M. aurelia* I exhibit a short series, remarkable chiefly, I think, for the small size of some of the specimens, one individual measuring only 29mm. I came upon this dwarf race on the borders of the Jesera lakes. There are two melitæids in the case which the Rev. George Wheeler, who has very kindly examined them for me, pronounces to be *M. veronicæ*, Dorf., appending the note: "but whether a var. of *athalia*, *aurelia*, or possibly *dictynnoides*, or a species, I cannot say." One comes from Illije and the other from Jesero.

"To fill up the case I have brought specimens of a few other Balkan nymphalids. They are *Libythea celtis*, *Polygonia egea*, *Limenitis camilla*, *Apatura iris*, and *Neptis lucilla*."

Mr. J. Platt Barrett exhibited a number of species and series of Sicilian butterflies, and communicated the following notes:—

"Marbled Whites.—Our friend, Mr. Gibbs, showed us a fortnight ago a series of *Melanargia larissa* var. *herta*, from the Balkans, and I wish to ask him whether he met with the closely allied species *M. japygia*, as I am much interested in that species, and have brought a score of specimens from Sicily to show you. I took a few of them to the London Entomological Society, but the experts there could not agree, and I got no information except that my specimens were large, and that, of course, I knew.

"Before touching on the Marbled Whites, I want to mention *Euchloë damone*, of which I exhibit a series from Sicily. This species occurs in Turkey and Greece, but is not recorded from the Italian mainland. It also occurs in North Syria. I have examined the series of *E. damone* at the Natural History Museum, and the specimens from Greece and Syria are identical with mine. I have just come across a statement on Page xlii. of the "Proceedings of the Entomological Society of London," that specimens from Asia Minor differ to some extent, but I have not seen them, so I cannot form an opinion for myself. I may mention, however, that in the series of *M. damone* at the Natural History Museum S. Kensington, at the bottom of the row, there are two specimens from the Transcaucasus, which, while identical as to markings on the upperside, are smaller than the others, and on turning to the underside I found they are labelled *E. eupheno*. I attribute the error to the fact that the European butterflies, have recently been re-arranged in a new cabinet.

"My exhibit of *Melanargia japygia*, consists of about a score of examples from Sicily. I have not yet been able to refer to the original description by Cyrille, but hope to do so shortly.

"Roughly, I divide the "Marbled Whites" into *dark* and *pale* forms. *M. galatea* belongs to the former class, having more black than white on the upperside. *M. syllius* and others have more white than black. *M. larissa* and the Sicilian form of *M. japygia* belong to the dark class, while its variety *cleanthe* (Spain), and sub-species *suwarovius* (Hungary), belong to the pale class.

Owing to re-arrangement of the Butterflies at the Natural History Museum the *Melanargias* are not quite completed. One specimen (identical with mine) is labelled "type Sicily," and others (also identical) are labelled "Leach Collection, *M. larissa*, (Greece)." They are placed with *M. japygia*, but the labels have not been altered. The Sicilian specimens are larger than any others I have seen, the ordinary size being about $2\frac{1}{4}$ inches, while the Sicilians reach $2\frac{3}{4}$ inches. Perhaps this is a "seasonal" difference.

"*Melanargia pherusa.*—This series of Sicilian examples shows the gradual growth or diminution of the rings on the hindwings.

Type (with rings) *pherusa*.

Var. (without rings) *plesaura.*

"*Melanargia galatea.*—While in Sicily I found some large females of *M. galatea.* Ordinary specimens measure two inches, a little more or less. These large females occur at Messina and Syracuse, and also midway at the foot of Monte Scudei—and reach 2½ inches in size. On examining the Marbled Whites at South Kensington I discovered this form under the name of *lucasi* (Rambur) with synonyms.

1. *clotho*, ♂ (Lucas) and figure.
2. *mauretanica*, Algeria (Oberthür).
3. *mauretanica*, Lang. The locality given is Atlas Mountains, Algiers. I may mention that the specimen figured as *clotho* is a male, and has no resemblance whatever to my large females, but the females of *lucasi* agree exactly with my *dark* specimens taken at Messina, except that the Sicilian examples are a little larger (perhaps, as I have said before, a "seasonal" variation). Now I am waiting for my next visit to Sicily to get further information. At present I am inclined to think that *M. galatea* ab. *major* would suffice for its name—but it is unwise to decide on insufficient data.

"It was very pleasing to find that Zeller's type specimen of *M. galatea* var. *syracusana* (dated 1844) still exists in fine condition as fresh as ever; and those I took on the River Anapo agree with it. Var. *procida* seems to be confined to Calabria, and Messina specimens show a tendency to combine *syracusana* with *procida*. I have added Kentish specimens for comparison."

Mr. W. J. Kaye exhibited the pupa of *Lycæna arion*, taken in North Cornwall by Mr. Percy Richards in 1908 in the nest of a species of ant. It was stated to have been in a frail cocoon in the substance of the nest, and not merely lying among the growth over the top.

Mr. F. W. Frohawk exhibited a variety of *Euchloë cardamines* in which the discoidal spots of the forewings were very considerably within the orange apical area.

L.W.

APRIL 10*th*, 1913.

Mr. Newman exhibited a number of the stick insect (*Dixippus morosus*) which several members had bred extensively. He pointed out one specimen, a very melanic form, as unusual. He also showed a remarkable aberration of a hybrid moth from a crossing of *Ephyra annulata* (*omicronaria*) male, with *E. pendularia* female, in which the outer half of all the wings was melanic.

Mr. A. E. Gibbs read a paper entitled, "Through the Balkans with a Camera," illustrating his remarks with a large number of lantern-slides of views and scenes in the countries of Bosnia and Hercegovina through which he had made a collecting tour during the summer of 1912.

The following is a resumé of his remarks :—

Travelling down the eastern shores of the Adriatic sea, Mr. Gibbs visited the interesting old towns of Spalato and Ragusa, where some butterfly-hunting was done. From Cattaro, on a beautiful arm of the sea, the Black Mountain was crossed into Montenegro, and at Cettinje, the chief town of that little kingdom, some time was pleasantly spent investigating the entomology of the mountains by which the village-capital is surrounded. It had been intended to go on from thence to Scutari, about which so much has been heard of late, and to endeavour to explore the surrounding districts of Albania, but the Montenegrins and the Turks had already begun to quarrel, and the boat had ceased running. Plans, therefore, had to be changed, and the frontier a little further north was visited, Podgorica, a small market town, being made headquarters. After leaving Montenegro Mr. Gibbs proceeded to the Hercegovina, collecting in the neighbourhood of Mostar, the capital, and of Jablanica, a pleasant mountain resort, where a comfortable little hotel has been established. Proceeding to Bosnia, a stay of some length was made at Sarajevo, with its interesting old Turkish bazaar, thronged with people of many nationalities, attired in quaint costumes. Sarajevo furnished many artistic pictures, being a truly oriental town, with numerous mosques, whose graceful minarets were prominent features in the slides which were thrown on the screen. From the capital a dash was made to the Turkish frontier in a motor-car, passing through very mountainous country and halting at many towns little visited by English people, such as Gorazda, Cajnica, and Foca. The audience were then taken in imagination to the beautifully wooded district in the north of Bosnia, pictures being shown of historic Jajce, busy Banjaluka, and Travnic with its painted mosque and picturesque market.

APRIL 24*th*, 1913.

Mr. and Mrs. Lindesay Jones, of Baker Street, London, W., were elected members. The evening was devoted to an exhibition of specimens of all Orders other than lepidoptera, and was a most successful meeting.

Mr. Robert Adkin exhibited, on behalf of Mr. R. Armstrong Adkin, series of the snails *Helix hortensis*, Müll., and *H. nemoralis*, L., and called attention to the great variation exhibited by both series, and particularly to one of the latter, a yellow specimen with a single white band; also a long series of *H. aspersa*, Müll., all taken on the chalk near Eastbourne, which showed much variation both in colour and pattern.

Mr. Adkin also exhibited an original copy of "A Naturalist's Calendar," published in 1795 by Aikin, being a series of extracts from Gilbert White's diaries, and a copy of "A Nature Calendar," published for the first time in 1911, under the auspices of the Selborne Society, and edited by W. Mark Webb, being a facsimile copy of Gilbert White's Calendar of Flora, 1766, or "Flora Selborniensis: with some coincidences of the coming and departure of birds of passage, and insects, and the appearing of Reptiles, for the year 1766." He said that he thought it would be interesting to compare the meagre extracts from White's writings, given in the former publication, with the full text of one of his diaries as given in the latter.

Also a spider's web mounted on glass with the spider (*Epeira diademata*) *in situ*. It was prepared by the late Mr. H. McArthur, and was a remarkable piece of mounting, every strand of the web being in position just as one might find it in one's garden on an autumn morning.

Mr. W. West (Greenwich), Hon. Curator, placed on the tables some 16 drawers of the Society's Collections (British):—

2 of ORTHOPTERA, presented by Mr. Malcolm Burr and others;

2 of NEUROPTERA, presented by Mr. W. J. Lucas, Mr. W. J. Ashdown, and others;

1 of HYMENOPTERA;

11 of COLEOPTERA, largely presented by Mr. West himself.

Mr. West also showed 12 drawers of British RHYNCHOTA, from his own collection, comprising HETEROPTERA, HOMOPTERA and PSYLLIDÆ.

Mr. E. A. Newbery exhibited a number of interesting, rare and local species of British Coleoptera, comprising *Apion selousi*, nov. sp., undescribed. *Trachyphloeus digitalis*, Gyll., new to British list. *Homalota aquatilis*, Thoms., recently added to the British list. *Lathrobium ripicola*, Czwal., recently added to the British list. *Myrmecòpora brevipes*, Butler, new, and recently described. *Thinobius pallidus*, Newb., new, and recently described. *Cartodere argus*, Reitt., introduced sp.; the only specimen yet recorded from Britain. *Dermestes peruvianus*, introduced sp. (from Liverpool).

Bledius denticollis, Fauv., *B. filipes*, Sharp, and *B. secerdendus*, Joy =*subniger*, Schneid. ?, recently added to the British list. *Ceuthorhynchus parvulus*, Bris., recently added to the British list. A species of *Homalota*, at present unrecognised. *Laccobius purpurascens*, Newb., recently brought forward as a new species. An undetermined species of *Anobium*. *Orthochaetes insignis*, recently added to the British list. *Haliplus heydeni*, Gerh., *H. immaculatus*, Gerh., and *H. fluviatilis*.

Mr. Priske exhibited a collection of the shells of *Helix nemoralis* and *H. aspersa*, taken at Seaton, Devon, to show the range of variation in that locality. He also showed a varied series of the coleopteron, *Geotrupes mutator*, taken at Hanwell, in September 1912.

Mr. Ashdown showed examples of the species of *Hemiptera* and *Hymenoptera* taken by him in Switzerland, including *Cicadetta montana*, *Ælia acuminata*, *Strachia ornata*, *Harpactor iracundus* and *Mutilla europæa*.

Mr. W. G. Sheldon exhibited two species of fire-fly, *Phausis splendidula* and *Luciola mingrelica*, which he had met with on the continent of Europe, and remarked on the habit of both the male and the female "flashing." He also showed the eggs of two of our migratory birds, the redwing, and the field-fare, which he had obtained during his trips to Lapland.

Mr. Hy. J. Turner exhibited a number of *Homoptera*, from S. America, all having much the appearance of lepidoptera with ample wings, with, in some cases, markings which made the resemblance much closer. One of the last was *Pœciloptera phalaenoides*. Also a number of species of *Heteroptera* of bizarre markings and forms, mainly from Colombia, including specimens of *Apiomerus hirtipes*, which had two curious processes ("flags") at the anal extremity of the abdomen. Two species of the large bodied *Orthoptera* which the natives of the Transvaal were said to use for food. These were *Phymateus ægrotus* and *P. morbillosus*. In addition he exhibited a box of unnamed and probably rare or little known species from the up-country area of Western Australia, including striking forms of Diptera, Hymenoptera (*Ichneumonidæ* and Aculeates), Myrmeleonidæ, and Odonata, with some fine species of Coleoptera.

Mr. K. G. Blair exhibited living Scorpions, Earwigs, and Glow-worm larvæ found by him at Monaco, and gave his experiences with the "flashing" of the fire-flies in the United States of America. He said that both sexes "flashed" and that there were appreciable differences both in the periodicity and in the strength of the flashes. Small electric bulbs had been used to imitate both the male and the female flash, and this had been so well achieved that the "flashing" of the bulbs had been answered by the females or the males, as the case might be.

Mr. E. Step's exhibits included the following British *Crustacea*:—A female *Portunus puber*, with the mass of ova attached to the appendages of the abdomen; *Callianassa subterranea*; *Thia polita*, male and female; *Galathea squamifera*, and examples of the same species parasitized by *Pleurocrypta galateæ*, its presence shown by a considerable bulging of the carapace on the left side; *Ebalia tuberosa*, *Hyas coarctatus*; and *Xantho incisus*.

Mr. Step also exhibited the rare dipteron *Ogcodes gibbosus*, on which he read the following note:—

"This little hump-backed spider-fly was taken in my garden at Ashtead last summer; and I am indebted to Mr. Andrews for its identification, and for references to records of its previous capture. It is a representative of the family *Acroceridæ*, whose members are characterized by a weakness for destroying spiders by feeding upon them internally as larvæ. *Ogcodes gibbosus* is an exceedingly local species, and apparently rare in its few localities. Curtis (quoted by Verrall) records it from Wimbledon Common and the adjoining Coombe Wood; and a specimen in the Oxford Museum is labelled "Richmond Park, July 4th, 1835." Its principal locality to-day appears to be the New Forest; but it has been recorded also from two localities in Herefordshire, and one in Suffolk; to which must now be added Ashtead, Surrey. The head of the fly is remarkably small, and consists almost entirely of the two compound eyes. The great disproportion between the tiny head and the high rounded body, gives one the impression that the latter would be normally much smaller, but that it has been inflated by some diseased condition. This effect is intensified by the fact that the thorax is covered by a rather matted coating of whitish-grey hairs, which gives it the appearance of a house-fly that has been killed on our windows in autumn by the activity of the fly fungus. It is just possible that it may not be as rare as supposed, but that specimens may be passed with a cursory glance in the belief that they are merely diseased house-flies.

"Having regard to the fact that the food of the larva is plentiful, and that feeding under cover it runs few risks, one would expect the fly to be quite common. But it has an enemy who takes effectual steps to keep down its numbers. This enemy is a hymenopteron, *Crabro interruptus*, a little wasp that makes tunnels in decaying wood, bramble-stems, and the like, dividing the tunnels into cells, in each of which an egg is laid, and the cell packed with flies. Each species of *Crabro* appears to have its own special taste in flies, and will provision its cells with only one species. Whether *Ogcodes gibbosus* is regularly exploited for the purpose is not established, but that it is so used an occasion is made clear by a communication to to the "Ent. Mo. Mag." (Vol. xxxviii., 1902, pp. 205-6) from the Rev. H. S. Gorham, who came upon a hoard of the flies in a nest of the wasp. The latter, with that regard for economy of labour that is shown by many species, instead of making a tunnel for itself, had found one that had been excavated by the larva of *Gortyna flavago* in the stem of the marsh thistle. This she had divided into cells, and packed each of them with *Ogcodes gibbosus.* There were twenty-five to thirty flies in each cell, and the row of cells measured eight inches. In some of the cells the wasp-egg had hatched and the wasp-grub was already feeding upon the stored up flies. A further peculiar circumstance of this discovery is that Mr. Gorham's attention was attracted to the thistle, not by the entry of the wasp with its prey, but by the fact that several spiders appeared to be watching the hole in the stem. The spiders—whose name he did not know—so greatly resembled the fly that he considered it to be a case of mimicry. Mr. Gorham considered these spiders to be of the actual species parasitized by *Ogcodes*, but I fail to see that he had any evidence to that effect. It may be so, and they may have been watching rejoicingly to see how many of their enemies were being safely interred in the stem of the thistle; or they may have been attracted by the odour of fly emanating from such a store, and were discussing ways and means for breaking into a larder so well stored with spider food."

A further exhibit by Mr. Step was the living larvæ of *Anthrenus musæorum*, the museum-beetle.

Mr. Main exhibited some parasites of the two species of cockroach—*Periplaneta orientalis*, and *Blatta germanica*—and a large example of the glow-worm, *Lampyris noctiluca.*

Mr. Ashby exhibited a box of Hemiptera and Coleoptera from Oyo, Southern Nigeria, with two drawers of British Coleoptera, containing the genera *Donacia*, *Chrysomela*, and *Cryptocephalus.*

Mr. Colthrup exhibited a large collection of the eggs of the common guillemot (*Lomvia troile*) showing great variation.

Mr. A. E. Gibbs exhibited a number of giant Saw-flies, and communicated the following notes:—

"A few years ago I had occasion, as the visiting member of committee, to inspect the wood-working classes at our manual training school at St. Albans. The instructor called my attention to a trunk of silver fir, which had been bought from a local dealer, and which was so extensively tunnelled by wood-feeding larvæ as to be useless for school purposes. I got him to put the wood on one side for observation, and a few days after I was asked to examine an insect which had emerged from it, and which proved to be a female *Sirex noctilio*. This was followed by the emergence of numerous other specimens, which continued to make their appearance until the cold weather set in. I was much interested in this saw-fly infestation, and obtained a number of specimens of the damage done to the timber, some of which are shown in this case. The specimens I exhibit illustrate in a remarkable way the life-history of the creature. The tunnels can be traced from the point at which the egg was probably deposited, to the pupa cell. As the larva grows, its burrow, of course, becomes larger, and as it progresses it fills up the space behind it with the rejected woody frass, which is so tightly squeezed together as to necessitate the use of a knife or bradawl to clear the tunnel of the refuse. The holes made by the escaping flies are clearly shown in some of the pieces of wood. A good deal of the tree had been sawn into planks, and these were piled one above the other against the wall of the building, so that after leaving their pupa cases the flies had to bore through a succession of planks to obtain their liberty, and this they did apparently without inconvenience.

"Strangely enough during the time I had *Sirex noctilio* under observation, my co-secretary at the County Museum, the late Mr. F. G. Kitton, a clever artist in black and white, and a well-known Dickens enthusiast, brought me a specimen of another species of *Sirex*, the giant saw-fly, *S. gigas*, which so far as my experience goes, is a commoner insect. It appeared in his wood-cellar, and greatly frightened the servant, who took it to be a hornet, as most people do. From that time onwards a good many others appeared. Investigation showed that they were emerging from a heap of fir-wood, and Mr. Kitton brought me the piece of wood now in this case, which shows the ends of the tunnels from which they escaped.

"I made enquiries as to the origin of the timber in both instances. In the case at the manual training school, the tree, a silver fir, had been grown upon the estate of Mr. Lewis Evans, F.S.A., at Russells, near Watford; while the wood in Mr. Kitton's cellar was the remains of a fir tree of an undetermined species, which grew in his garden at Pré Mill House, near St. Albans. The last-named tree had been blown down, and had been allowed to remain for some time where it fell, and it was probably then that it had been attacked by the saw-fly."

Mr. Gibbs also exhibited a case of Hemiptera, and communicated the following notes:—

"This is one of a series of Museum cases which I have prepared to illustrate the chief Orders into which the Class *Insecta* is divided. I have chosen this case because the Order *Hemiptera* includes the *Cicadidæ*, and I found the south European species to be very plentiful in the Balkans last summer. In a pocket box I show three specimens which I caught on tree trunks in the Narenta valley one afternoon, when no butterflies were to be had.

"I have devoted the top half of the case to the *Heteroptera* or true bugs, which may be roughly distinguished by having horny forewings and fairly long antennæ, while the *Homoptera* in the lower part of the case have membranous forewings and generally short antennæ.

"The idea in preparing this series of cases has been to procure large and conspicuous examples of the various Families, so that their distinctive characteristics are easily apparent. For this reason exotic specimens have been largely used, but there are some British insects shown, as for instance the bed-bug (*Cimex lectularius*), which it is a relief to know is not really a native species, but was introduced into England in the 16th century, and did not become common until after the great fire of London, when large numbers were introduced in foreign timber. There are some of our British water species in the case, taken in my own grounds, these, of course, being among the Heteroptera. Many of the most showy bugs belong to the Homopterous families, such as the *Fulgoridæ*, or Lantern-flies, which some authorities tell us are luminous, while others deny the statement; the *Membracidæ*, which includes some curious instances of mimicry; and the *Cicadidæ*. Mention of the latter family brings me back to the Cicadas I brought home. These creatures swarmed everywhere in the warmer parts of the Balkans, and the males made a very great noise. They settle on the tree trunks, and you can easily locate them by the din they make, but when you approach close to them they become quiet, and if you attempt to catch them they fly rapidly away. One of them invaded a railway carriage in which I was travelling. A man who was in the same compartment saw it, imitated its call, closed the window, chased and caught it. I fear it had a bad time at his hands. The males only are provided with abdominal drums, which are the noise-producing organs, the females being silent. This fact was known to the ancients, and one of the classic poets says:—

'Happy the Cicadas' lives,
Since they all have voiceless wives.'

We have one small species of Cicada in England, confined, I think, to the New Forest, *Cicadetta anglica* (*montana*), of which there is a specimen in the case, in company with some huge foreign species. Some Homoptera such as the Aphides and Coccids are familiar garden pests."

Mr. H. Moore exhibited two drawers of ORTHOPTERA, including European *Œdipodidæ* (attention was called to those set with closed wings, which showed how the general coloration varied with that of the soil where captured), and some of the larger exotic leaf-crickets, and apterous eastern European camel crickets.

A box of *Xylocopidæ* (violet carpenter bees) from various parts of the world.

Fulgoridæ including *Fulgora lanternaria*, the great lantern-fly of tropical South America, which Madame Merian described as luminous, but this has not been confirmed.

Foreign insects taken or brought to the exhibitor alive, introduced by shipping in merchandise, including *Blabera cubensis* Walk., a large cockroach found in a bale of hides from Ceylon; *Acheta bimaculata*, De Geer., taken as it alighted when standing at his own door in Rotherhithe; an unidentified leaf-cricket, found in a box of peaches at Covent Garden.

Acridium ægyptium, Linn., a large solitary locust found in a box of mimosa from N. Africa, and which was kept alive for over five months; *Xylocopa violacea*, Linn., the violet carpenter bee of Europe, found on a ship in the Docks; *Pteronarcys regalis*, Newn., a large semi-aquatic insect, common in Canada, but the specimen exhibited was found on a ship from Archangel, N. Russia.

A selection of ORTHOPTERA and HOMOPTERA to illustrate the following note on "Singing Insects."—

"Quite a considerable number of insects are capable of producing sounds sufficiently distinctive to be attractive to the human ear, and some of them have derived their popular names from the fancied resemblance of their notes to certain words, such as Katy-did, or from direct sound equivalents, such as the cricket, like the cuckoo among birds. In various countries certain of them, chiefly confined to the Orthoptera, are not only captured and caged for their song (so-called), but bred for purposes of commerce. It is quite an ancient trade in Japan, and at one time was of sufficient importance to warrant a Trade Guild and even in Europe a minature industry exists to supply the cages required. These cages differ with nationality—split-bamboo, wicker and wire-work, and even paper being used. In every instance it is only the male insects that "sing," and while the mechanism for sound production is practically the same in the various species, the shape and position varies considerably. This is found in the crickets at the base of the wing covers, grasshoppers merely rub the edge of the wing cover with the inner part of the hind thigh, while the South African *Pneumora* rubs the side of its abdomen, which, if I may use the word in its musical sense, has become all "belly." The volume of sound produced is marvellous, from a resemblance to the sighing of the wind in the tree tops to a noise like a steam whistle, that may be heard when travelling in a fast railway train. A Japanese species allied to our *Gryllus campestris* is known as the "King of Hell" cricket, simply I presume from the infernal noise it makes. The cicadas, belonging to the Homoptera, are the greatest sound producers, and hardly a traveller in warmer climes, but has described their music or discordance. The Australian "black-fellow" says "they are the abode of evil spirits:" the old Greeks numbered them amongst the blest.

Mr. H. W. Andrews exhibited a number of specimens of the "Witches Broom" fungus-gall *Ascomyces* sp. on Willow, together with types of various species (63) of Diptera taken in the months of March and April chiefly at sallow blossom.

Mr. G. H. Coxhead exhibited a number of specimens of Plant Galls dried, together with some very beautiful water-colour drawings of the same. Under the microscope he showed the gall on *Ranunculus ficaria* caused by the gall-fly *Uromyces ficariæ*, indicated by elongated distortions on the stem.

Mr. W. West (Ashtead) exhibited under the microscope four species of Collembola, viz., *Achorutes purpurascens*, *A. armatus*, *Orchesella villosa* and *Tomocerus plumbeus*.

Mr. A. W. Dennis showed a series of photographs of flowers and fruits, including those of most common trees.

Mr. Stanley Edwards exhibited large and conspicuous species of *Phasmidæ*, *Mantidæ*, *Locustidæ*, *Gryllidæ* and Hymenoptera from British North Borneo, together with examples of *Actinacantha arcuata*, a remarkable arachnid with extremely elongated processes from the thorax, specimens of the huge chelifer, *Thelyphonus lucanoides*, and another curious arachnid, *Gasteracantha vittata*. He also showed the fungus *Peziza badia* from Blackheath.

Mr. Frohawk exhibited a remarkable specimen of a mole with white spots and blotches about its fur; a very large slow-worm, measuring 17 inches in length, said to be the biggest on record. It came from Wye, Kent. He mentioned an adder which measured 28 inches, a female, from which some twenty young were taken; and showed a thorny branch of an apple tree which had grown from a pip planted some nine years ago.

Mr. C. Brooks exhibited a piece of Roman brick from Silchester, showing footprints of both dog and sheep; a piece of wood (beech?) bored by marine worms, which had since become fossilised; and a piece of pine from the foot of a glacier (Norway) showing the twisting and grinding caused by the moving ice.

MAY 8th, 1913.

Mr. E. B. Haynes, of Wimbledon, was elected a member.

Mr. H. E. Page exhibited a short series of *Erebia zapateri*, taken in Spain last year, which he was placing in the Society's cabinet.

Mr. Hugh Main exhibited a small cage with two living field-crickets, which had been brought from Lisbon, where people were in the habit of keeping these insects for their "singing." One of the crickets gave an exhibition of his power in the room.

Mr. A. E. Tonge exhibited a fine spike of flowers of the water-violet, *Hottonia palustris*, which is not a "violet," but a species of *Primulaceæ*. The plant is a sub-aquatic and grows in still-water ditches. The specimen came from near Ashford, where it was more or less common.

Mr. J. Platt Barrett exhibited the larva and pupa of a *Thera* feeding on spruce, and presumed that it was the true *T. variata*. He also showed two extremely fine saturniids sent to him in a letter from Nairobi, British East Africa.

Mr. A. Sich exhibited a number of species of Rhopalocera taken in the South Tyrol, including *Papilio machaon*, *P. podalirius*, *Libythea celtis* (which was abundant there), *Scolitantides orion*, *Glaucopsyche iolas*, etc.

Mr. Sich then read a paper entitled, "Spring in the South Tyrol." (See page 7.)

MAY 22nd, 1913.

Mr. Stanley Edwards exhibited an *Epinephele jurtina* with irregularly placed pale blotches.

Mr. West (Ashtead) exhibited another pale blotched *E. jurtina.*

Mr. Main exhibited photographs in colour of *Tephrosia crepuscularia in situ* on an oak-trunk on which a green alga was growing, half natural size.

Mr. R. Adkin exhibited a series of *E. jurtina* from various British localities, including a very fine race from the Scilly Islands with forms approaching the southern race var. *hispulla*, and a specimen of very varied coloration, comparable with the var. *splendida* of Buchanan-White.

Mr. Carr exhibited an almost symmetrically pale-blotched example of *E. jurtina ;* it was in excellent condition.

Mr. A. E. Tonge exhibited a short series of *Lobophora carpinata* (*lobulata*), bred from ova laid by a female in 1912 in Tilgate Forest. Two specimens showed a green ground tint, otherwise the series was remarkably constant in marking.

Mr. A. E. Gibbs exhibited a long series of *Epinephele jurtina*, including a number of pale blotched British specimens and some particularly bright forms hardly separable from the south European form var. *hispulla*, from Cornwall ; a series from the Vosges, Swiss and French Jura ; fine forms of var. *hispulla* from Corsica, some of them with very large apical ocelli and others with extra ocelli ; var. *hispulla* from the Balkans ; var. *taurica* from the Taurus mountains, Asia Minor ; var. *fortunata* from Algeria, a long and strongly marked series ; the same form from Teneriffe. He also showed other species of *Epinephele*, including *E. janiroides* from Tunis ; *E. pasiphaë* from the Pyrenees, and var. *philippina* from Algeria ; a short series of *E. lycaon*, with very uniformly dark undersides to the hindwings, from Hercegovina ; a number of English specimens of *E. tithonus*, including one curiously and uniformly blotched, from the New Forest, a fine female from the same locality with remarkably large extra spots, specimens from Polzeath, N. Cornwall, with extra spots, and a light straw-coloured male from the New Forest ; *E. ida* from Corsica, var. *dalmatina* from Dalmatia, var. *neapolitana* from Italy, and a specimen from Brussa, Asia Minor. One specimen of the pale-marked form was a most remarkably radiated example.

Mr. Hy. J. Turner exhibited a large number of specimens of *E. jurtina* from various parts of England and Ireland with examples from many Continental localities, including Turkey, Corsica, Crete, Algeria, Teneriffe, Portugal, Beyrout, Sardinia, the Balkans, Hyéres, Vernet-les-Bains, Gavarnie, Vosges, Geneva, and read a paper on the history of the species, showing the growth of the nomenclature from the time of Linnæus. (See p. 18.)

MAY 31st, 1913.

FIELD MEETING AT NETLEY HEATH.

Conducted by W. J. KAYE, F.E.S.

Six years ago, on June 8th, 1907, a field meeting was held on this same ground, when also Mr. and Mrs. Kaye, as on the present occasion, provided an open-air tea on the heath. The day this year was fine, if inclined to be chilly, but lepidoptera were exceedingly scarce, even less being taken than at the previous visit of the Society. For the future it seems desirable to put off visiting this beautiful but rather exposed locality till later in the year. Mid-June would probably give as good results as at any time, and certainly better than what is to be taken at an average season at the end of May. Although so little was done entomologically, a very enjoyable afternoon was spent, and again a very large muster arrived for tea, some thirty members putting in an appearance. In the Proceedings of the Society for 1907-8, pp. 60-61, will be found lists of plants and insects that were then recorded. Such species as were found on this occasion are comprised in that account, but in addition mention should be made of the extraordinarily fine flower trusses of bugle (*Ajuga reptans*) that were observed in masses in the lane leading up to the Heath. An interesting lichen, *Graphis elegans*, was found by one of the members.

ANNUAL CONGRESS OF THE SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES, held at Hampstead on June 4th to 7th, 1913.

By HY. J. TURNER, F.E.S.

Read JANUARY 8th, 1914.

Your delegates to the Annual Congress for the year were Mr. E. Step and myself. Owing, however, to pressure of business and several unforeseen circumstances, my colleague was unable to be present except on one occasion, so that the duty of writing a Report, unfortunately for the Society, devolves upon me.

As the programme for the week had but few items which were attractive to me, I must plead a certain neglect of my duty in absenting myself on various occasions, but I was not absent from any business meeting.

The alternative items on the list for the afternoon of June 4th, subsequent to the assembly of members at the Hampstead Town Hall, were a Topographical Ramble in inner Hampstead under the guidance of the Town Clerk, Mr. E. E. Newton, and a Natural History Ramble in outer Hampstead, both parties to meet for tea at the farm adjoining the famous Ken Wood. The first ramble was conducted by an enthusiast; and I spent an extremely pleasant afternoon in and around the haunts of many notable men of the past hundred and fifty years, concluding with a visit to the home of the badgers in Ken Wood, to which access had been kindly given by the Grand Duke Michael; and a nice *al fresco* tea at the invitation of the late Mr. Barham concluded the event. In the evening the President, Sir Hercules Read, gave his Address entitled, "The Belief of Our Ancestors in a Future Existence."

June 5th commenced with two business meetings at which Reports were read, and matters relating to the next Congress and the general business of the Union were discussed. Two papers were read during the morning, "The Hampstead Observatory and its Work," by Mr. P. H. Hepburn and "The Influence of Scientific Societies," by Mr. H. B. Wheatley, with subsequent discussions.

A feature of each of these Congresses is an Exhibition of all kinds of things, Natural History and other, of local interest and bearing; and one always takes the opportunity of a paper not quite congenial to one's taste to walk round the exhibits. Insects of all orders taken in Hampstead, birds obtained in the neighbourhood, fossils and samples of the various strata exposed in building, or pierced by borings, railway and drainage, old books of local reference, photographs connected with the county topographical survey, relics of famous men and women who have lived in Hampstead, all combined to make the exhibition one of the important and educative items of the meeting.

In the afternoon it had been arranged for the members and friends to pay visits to either the Zoological Society's Gardens or to the Gardens of the Royal Botanic Society. The larger company by far went on the latter visit, but for me the Zoological Gardens always have a charm; and some sixteen of us were conducted round them by Mr. H. Goodchild, a Fellow of the Society, keenly interested in birds. The evening function was special, the Mayor's Reception. Mr. Step could no doubt say something as to its success, as he came expecting to see his fellow delegate, who was conspicuous by his absence. The evening was, I understand, a very pleasant one, but subsequently, I believe, there was considerable local friction as to the financial matters with regard to it.

Friday, June 6th, brought another Council Meeting in the morning and two papers, "A Plea for a National Folk-museum," by Mr. W. R. Butterfield, and "The Geology of Hampstead," by Prof. F. W. Rudler. This latter was of very great local interest; it was delivered most ably and illustrated at all points with diagrams, lantern slides and specimens of local origin. The afternoon's arrangements were visits either to the Temple Church and the Inns of Court, under the inspired guidance of Dr. Martin, LL.D., or to the Hampstead Garden Suburb. Your delegate visited the precincts of the lawyers, and the enthusiasm in and deep knowledge of the leader of aught that was old and historic in inner London afforded a very pleasant afternoon to the large company who were present. The meeting finished with tea in the famous Clifford's Inn. The lecture in the evening was by Mr. E. W. Maunder of the Royal Observatory, Greenwich, on "The Early Astronomy," illustrated, I understand, with an exceptionally fine series of lantern slides.

The final meeting of the Delegates took place on Saturday morning, when the remaining reports were read, and the rest of the business concluded. It was decided that, subject to satisfactory preliminary arrangements, Bournemouth should be the place for the next Congress, in 1914. The morning papers were "Photographic Surveys and their Work," by Mr. L. S. Jast, and "The Biological Conception of Individuality," by Prof. Arthur Dendy. I conceived my own individuality, and did not remain to hear the latter paper, nor did I join in either of the motor tours which had been arranged for the afternoon. The one was to all the chief points of interest in Epping Forest, and was, I understand, most successful and well attended, in spite of the showers which came on at intervals. The other tour had Harrow-on-the-Hill as its main objective.

The almost total absence of Natural History in its stricter sense, the more or less previously well-known place of meeting, the not very attractive programme, and the absence from the Congress generally of many familiar faces, all combined to throw a sharp contrast with the four previous gatherings—Winchester, Guildford, St. Albans, and Folkestone—and to make the Hampstead gathering appear to be not so successful as most of its predecessors. However, if one reads the admirable Report of the Congress compiled by the able and energetic Hon. Secretary, Dr. Martin, a copy of which is in our Library, this conception is dispelled.

JUNE 12*th*, 1913.

Mr. W. J. Kaye exhibited several living plants of a form of the British spider orchis, which is usually known as *Ophrys aranifera*. A long discussion took place as to the specific identity of the form, and also as to the existence and varietal identities of the so-called early, and late, spider orchids. The examples exhibited came from Kent, in the neighbourhood of Folkestone, where the plant was somewhat abundant, and very varied in form and markings. A plant of the bee orchis, *O. apifera*, was also exhibited for comparison. It was pointed out that the spider orchis was shorter, less robust, and less conspicuous in the taller grass than the bee orchis, *Ophrys apifera*. The middle lobe of the "lip" of the flower was conspicuously projected outwards, and the markings, petals, and dorsal sepal were quite distinctive, while the tuber was decidedly greater in size than in the commoner species. According to Hooker and other writers the late spider orchis was a variety of the bee, *O. apifera*, and named var. *arachnites*, while the true spider orchis was a distinct species, and the flowers appeared earlier. The plants exhibited were intermediate as regards time of flowering. It was remarked that many orchids were prone to hybridize very freely, and varied immensely in form, colour, and markings.

Subsequently Mr. Kaye communicated the following notes:—

"I have been to Kew Gardens and had a long discussion with Mr. Rolfe, under whose care are the Kew collections, and he was immensely interested in the question. After consulting many authorities, he came to the conclusion (a wrong one, I think) that the Kentish specimens were *O. aschersonii*, Nant., a hybrid between *O. aranifera*, the early spider orchis, and *O. arachnites*, the late spider orchis. He agrees with me that the latter is not (as according to Hooker and others) a sub-species of *O. apifera*, but considers it, as some others have done (Hanbury, "Flora o Kent"), as a distinct species. To some extent I think Rolfe is right, in that my specimens are intermediate between *O. aranifera*, and *O. arachnites*, but to me it is obvious that all are one, *i.e.*, *O. aranifera*. The species is locally very variable, as at Folkestone and Hythe. Some localities only yield a single form, and others another single form, but it is not extraordinary to find a variety of forms growing together."

Mr. R. Adkin exhibited some tobacco leaves that were much infested by a species of beetle. The tobacco was grown in Turkey, and had recently arrived in England. It was found to have been considerably damaged by the ravages of the beetle larvæ, which had apparently fed inwards from the outsides of the bale in which the leaf was solidly packed, their burrows often extending from two to three inches into the tobacco. The species was identified as *Anobium paniceum*.

Mr. West (Greenwich) exhibited a short series of the homopteron, *Psylla albipes*, a species recently new to Britain, discovered by him on the white-beam tree, together with the allied *P. spartii*, which was to be found on broom.

Mr. Coxhead exhibited leaves of the blackthorn galled by the dipteron, *Cecidomyia pruni*, from Shooter's Hill, Kent.

Mr. Graham exhibited a nice aberrational form of *Abraxas grossulariata* in which the black markings of the forewings were coalesced and extended into a wide transverse band with consequent suppression of all the usual yellow markings.

Mr. Sich exhibited the egg-shells of the white ova of *Dicranura vinula*, which he had previously exhibited, and from which normal imagines had been bred.

Mr. Blenkarn exhibited a number of the coleopteron *Bruchus pisi*, found by Mr. Main in peas in a shop at Woodford, Essex; also a pair of the rare *Pterostichus parumpunctatus*, taken at Chopwell, Northumberland, in May, 1912.

Mr. Buckstone reported that he had taken *Colias edusa* at Ascot on June 2nd. It was a freshly-emerged specimen. He had also seen *Pyrameis atalanta* and *P. cardui*, and at Horsley, on June 3rd, he had seen three more *C. edusa*. Mr. Edwards said that *Chrysoclysta linneella* was out quite to its average date of appearance this year.

JUNE 21*st*, 1913.

FIELD MEETING, MICKLEHAM.

Conducted by MESSRS. CARPENTER *and* STEP.

Although the day was fine, and the route taken was through a favourable district, insect life was not at all abundant. Little worthy of record appears to have been taken or observed, and so the usual lists have not been sent in by those who attended. In spite of this drawback, those attending appear to have enjoyed the walk, and to some of these it may have been the means of introducing them to several spots ordinarily very productive and not overworked. Starting from Leatherhead station the route lay over the Mole and through the river meadows to Thorncroft; then by Downs Lane to the Ermyn Way above Cherkley, and south to the open Mickleham Downs, brilliant with the blossoms of stonecrop, rock-rose, and viper's bugloss. Thence through the beechwoods we descended to Mickleham Church, and took tea at the "Running Horse." After tea the return to Leatherhead was made across Norbury Park and the meadows again.

Mr. Sich reports that the feature of the afternoon to him was the abundance of a Tortrix of the genus *Sciaphila*, probably *subjectana*, but he did not actually identify the species. They came out of certain bushes in clouds. Other species noted by the same gentleman were *Stigmonota compositella*, *Chrosis tesserana* (*alcella*), and the tineids *Gelechia terrella*, *Tinea cloacella*, and *Micropteryx seppella*. He also took one larva of *Gracilaria semifascia* (?) on maple.

JUNE 26th, 1913.

Mr. Main exhibited the pupa and living larva of *Parnassius apollo*, found by him near Meiringen; a living salamander, and the larva of the tiger-beetle, *Cicindela sylvatica*, from the same locality. He said that although he had spent some time searching he had failed to find the larvæ of *Ascalaphus*, but had met with the larvæ of the ant-lion *Myrmeleon* in considerable abundance.

Mr. R. Adkin exhibited some partly-formed apples from Felixstowe which had been bruised and damaged by the hail of the recent storms. He said that the crops were completely spoiled in many places. Mr. Step said that at Ashtead the branches of trees were in many places quite stripped of leaves, and where the latter remained they had pieces cut out of them by the hailstones.

Mr. Coxhead exhibited galls on leaves of beech, and coloured drawings of the same. They were subsequently found to be caused by a cecidomyid, *Mikiolo fagi*.

Mr. A. E. Gibbs exhibited a series of *Euchloë cardamines*, and contributed the following notes:—

"This series is from Sicily, taken in the neighbourhood of

Messina, from March to May, 1913. Their small size is noteworthy; of the 30 specimens, 23 were less than 35mm. in expanse, several of them measuring only 31mm., while the remaining specimens were between 35mm. and 40mm. Wheeler, in his "Butterflies of Switzerland" gives the average size as 42mm., commonly 37-45mm., exceptionally 31-49mm. It will thus be seen that a large proportion of these Sicilian specimens are exceptionally small. They are of the southern variety known as *turritis*, in which the orange apical patch does not extend beyond the black discal spot. This spot varies much in size. In one specimen it is almost obsolete, while in others it is as large as in average British examples. The names of *minor* and *hesperides* have been given to these very small forms. I have also put in the box my largest and smallest continental specimens, both from Vernet-les-Bains, in the Eastern Pyrenees. The former, a female, reaches 47mm. and the latter, a male, only 30mm., even smaller than the Sicilian, but in this case it was exceptional, and not the prevailing form. There are also large and small British examples, a female 46mm., a male 34mm., and females 43mm. and 33mm. I have occasionally taken this small form in my garden, but in my experience it is rare."

Mr. Sich said that he had so far this year seen but few *Abraxas grossulariata*, and all had been small specimens. Several members had made similar observations. It was suggested that during the period of the final feeding up of the larvæ, the weather had been very hot. Mr. Blair had found the larvæ of that species feeding on laurel.

Mr. Edwards noted that the imagines of *Eupithecia oblongata* (*centaureata*) were very scarce this year.

Dr. Chapman said that in many parts of Switzerland the severe April frosts had killed the vines. In the Rhone valley the walnut trees had been extensively damaged by the late frosts, which had killed not only the shoots of this year, but many of the smaller branches also. Both Messrs. Blair and Main had noted similar damage around Meiringen and Lucerne.

Mr. Platt Barrett reported that he had been to Sicily, but the intensity and early appearance of the heat-wave had compelled him to return. On one occasion he had seen a cloud of *Aporia cratægi* previous to a storm; they were going west. None were to be seen the next day. He had also on another occasion seen a cloud of *Pieris brassicæ*, also going west. The butterflies were very early this year; he had been unable to get any *Melanargia* *pherusa*, as they were over before he visited their locality. During a month they had experienced only two storms in Sicily.

JULY 5th, 1913.

FIELD MEETING AT WESTERHAM.

Conductor.—ROBERT ADKIN, F.E.S.

Just twenty-three years ago the Society held a Field Meeting at Westerham for the first time. On that occasion the late John T. Carrington, than whom few were better acquainted with the neighbourhood, or more capable as a leader, conducted the party. The morning had been very wet, but that did not prevent twenty-four members venturing on the trip; and although on their arrival they found the whole place so saturated as to make collecting almost out of the question, enough was seen of the promising nature of the surrounding country to induce the holding of two further field meetings there within the following three years.

Since that time the Society has frequently visited the locality, their activities on some occasions extending over the wooded commons to the South of the town, known locally as "Charts," and at others to the chalk downs to the north, all good collecting grounds; and those of our members who have not yet explored them, and wish to gain a rough idea of the district, will find it described on referring to the "Proceedings" for 1905-6, page 42.

On the present occasion the route taken was by the footpath entering Squerryes Park, near the ponds, to Crockham Hill Common; and although the public are allowed to use this path at will, they are not permitted to stray from it. However, the owner of the park, the Hon. Mrs. Warde, on being informed of our proposed field-meeting, very kindly gave her permission for the members to wander as far as they pleased within the confines of the park, a liberty that was much appreciated; but what was our surprise on entering the path to find her factor awaiting us with an invitation to view the private grounds, and it need hardly be said that it was readily accepted by all present. We were accordingly conducted through the delightful old time gardens, by the house where General Wolfe, the hero of Quebec, was wont to spend much of his leisure.[1] We were shown the spot where he stood when he received his first commission; and finally passing through the rose-garden, rejoined our footpath.

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[1] The house where General Wolfe was born stands at the farther end of the town from the park, the one where he afterwards lived being opposite to it, and now kept as a Museum of Wolfe relics; he was, however, a frequent visitor at Squerryes Court.

Then, continuing on through the woods of mixed timber within the park, and passing through the gate at its extremity, we emerged upon the pine-covered Crockham Hill Common, where the afternoon was spent. But hardly had we commenced operations when a thin drizzle set in, a twin brother to a Scotch mist, which during the hour that it lasted so damped all the exposed herbage as to make any form of collecting difficult, and probably accounts for the dearth of notes of captures and observations that have been sent in The only butterflies met with appear to have been a solitary *Aphantopus hyperantus* and two or three *Cœnonympha pamphilus*, which were disturbed from their resting places. Flitting among the pines *Bupalus piniaria* was seen frequently, while on the trunks several *Ellopia prosapiaria*, *Thera variata* and *Scoparia ambigualis* were found at rest, and, of course, *Acidalia aversata* and *Camptogramma bilineata* put in an appearance, as did also a stray specimen of *Bryophila perla*, and sundry other equally common species. But if for the time being collecting was poor, the beauty of the country, with the fresh moisture upon it, enabled a very pleasant time to be spent by the party of twenty-three who had assembled, and of whom twenty eventually adjourned to a meat tea at the "George and Dragon," Westerham.

In conclusion, the Society desires to express its thanks to the Hon. Mrs. Warde for the facilities so kindly extended to the party on the occasion of their visit to Westerham.

JULY 10*th*, 1913.

Mr. R. Adkin exhibited series of *Cyaniris argiolus*, viz. (*a*) reared in July and August, 1912, from larvæ collected at Eynsford, Kent, from dogwood berries, in the previous June; (*b*) reared in April and May, 1913, from the same lot of larvæ; and (*c*) reared in April and May, 1913, from larvæ collected at Eastbourne, in September, 1912, from ivy flower buds. The spring emergences (*b* and *c*) closely resembled each other and showed nothing of the heavy bordering of the females present in the summer emergence (*a*), although in the case of the Eynsford series (*b*) they had remained in pupa some three months longer than the Eastbourne series (*c*); thus the time of the emergence of the imago appeared to be the dominating factor in fixing its form, irrespective of the time of year at which the larva had fed, or what it had fed upon.

Mr. Edwards exhibited a box of Papilios of the *aegeus* group from the Australian region, including a pair of the rare *Papilio gambrisus*. He also showed a fossil tooth of the prehistoric ox, *Bos longifrons*, found in excavating at the Royal Albert Docks in the Pleistocene river gravel.

Mr. Blair exhibited a nest and the female of the wasp, *Polistes gallica*, brought by him from Meiringen. The female had been kept alive for the last three weeks and continued to feed the grubs in the cells with caterpillars with which she was supplied.

Mr. J. Platt Barrett remarked that he considered, from examination of specimens of *Abraxas grossulariata* of various years, that the 1913 captures were of about the average size and not smaller than in the few previous years. He exhibited examples of 1904, -6, and -13, all years more or less dry in the spring, while the larvæ were feeding after much rain. 1904 was very sunny and produced pale examples at Margate. Those of 1913 at Forest Hill approximate to dark specimens at Margate in 1906. Other species were also shown to compare in size with 1913 specimens, including *Camptogramma bilineata*, *Hypsipetes furcata* (*elutata*), *Cidaria fulrata*, *Geometra papilionaria* and *Metrocampa margaritaria*. Several members were of opinion that the *A. grossulariata* of the present year were quite up to the average size. (See page 115).

JULY 24*th*, 1913.

Mr. Stanley Edwards exhibited the eggs of the common European tortoise, *Testudo graca* ; and also a pair of the beautiful erycinid, *Stalachtis evelina*, from the Lower Amazons.

Mr. R. Adkin exhibited specimens of *Œcophora pseudospretella* which he had bred from hare's fur.

Mr. Curwen exhibited a number of specimens of *Polyommatus icarus*, taken recently at Pickett's Hole, near Dorking, which showed variation in the spotting and coalescence of the spots on the undersides. Only one specimen was ab. *arcuata*, but several were partly *arcuata*, and several others had united spots on the lower wings.

Mr. J. P. Barrett read the following Notes on the MIGRATION OF BUTTERFLIES :—

"In May, 1910, when I was at Messina, I was told by one of my son's workmen that I ought to go to his home—a village about five or six miles from Messina, named Cucuraci, where there was an invasion of butterflies every year, and he fixed the date as May 20th. He said they were 'White,' they always came over the hill and passed down the valley. He promised to let me know when they arrived, but later on he told me they had not come that year, and I heard no more about them—but from various people the man was corroborated in his statement.

"This year (1913) I arrived at Messina on May 17th, and next day we planned a picnic to the Campo Inglese (English Camp), famous in the days of Lord Nelson. We were detained in the morning by a review of the soldiers and a distribution of Tripoli medals, so the sun was hot when we started on our journey, uphill all the way, of five or six miles. My son was on horseback, and my daughter and I took a carozza as far as the military road extended. Then my daughter mounted, and she with my son took the steep 'mule-track,' while I followed leisurely looking for butterflies. On Monte Cicci I had a magnificent view of the Straits of Messina and intervening valleys, and Cucuraci on my left. Presently a cloud of butterflies came in sight and crossed the valley below, going westward, and a few stragglers reached the slope I was on. There must have been thousands of specimens.

"The next day I went to Mount Etna, and on May 21st in the forenoon I found myself suddenly surrounded by 'black-veined white' butterflies. I captured about a score in order to get a series of the Sicilian form (named *augusta*), but soon a thunderstorm came on and all butterflies disappeared. I was able to find cover in a 'shelter' which the labourers had built up of lava got from a cornfield.

"On returning to Messina there was a message for me from my son's workman telling me the white butterflies invaded Cucuraci on May 18th, and his English clerk and Mr. Peake (an entomologist) also saw the cloud crossing La Scala—another valley further west than the one in which I saw them.

"I think there is a suitable place of origin not many miles away on the Calabrian coast, where two rivers—the Messina and its tributary, the Marepotamo, form an immense plain. I hoped to go there, but the heat was so intense during my stay that I gave it up.

"Curiously, all the specimens of both *P. brassicæ* and *A. cratægi* that I took in connection with these migrations were males in good condition."

Mr. A. Sich exhibited the cocoon of *Nepticula viminetella*, which was formed at the tip of a willow leaf; a case of a species of lepidoptera found on a tree trunk near Wiesbaden; and a specimen of the "snail-plant," a species of *Medicago*, of which the seed pods develop into sinistral coils.

AUGUST 14*th*, 1913.

Mr. Edwards exhibited two fungi, *Polyporus hispidus*, found on an apple tree, and *Polystictus abietinus* taken from a fence post; together with a pupa of the dipteron, *Tipula oleracea*, from Upminster, Essex. He also showed examples of the common African butterfly, *Hamanumida dædalus*, a species which shows extreme variation in both the ground colour and the development of the spotting, according to the nature of the soil of the locality and the season of the year.

Mr. J. Platt Barrett exhibited specimens of *Satyrus hermione* from Sicily, which, compared with the Swiss race, were much larger in size; and specimens of *Raywardia telicanus* and *Lampides bœticus*, also from Sicily. He also exhibited specimens of the pupæ *in situ* of *Nonagria sparganii* and *N. typhæ* from E. Kent; in the former the head was upwards, and in the latter the head downwards; of the former species he showed specimens of the ichneumon parasite.

Mr. Dennis exhibited a specimen of the large broomrape *Orobanche major*, found by him at Earl's Colne, Essex; and a gall on plantain caused by the larva of *Tortrix icterana*.

Mr. Sich exhibited a viviparous form of the grass *Festuca ovina*, found growing on the quay at Flushing (Vlissingen), Holland.

Mr. Curwen mentioned that *Colias edusa* was common at Mickleham on August 10th, and that he also saw a few *Nisoniades tages* on that date, no doubt specimens of a second brood.

AUGUST 28*th*, 1913.

Mr. B. H. Smith, B.A., F.E.S., *Vice-President*, in the chair.

Mr. Main exhibited the living imago of a female ant-lion, which he had bred from a larva taken by Mr. Blair and himself at Meiringen in June, and which he was keeping so that if a male were bred he could pair them and get fertile eggs. This imago would not take food voluntarily, and had to be "forcibly fed." His method was to hold the ant-lion by its closed wings in a pair of forceps, and a fly, preferably one just recently emerged from the pupa, was presented to it. If hungry, it would seize and devour the fly after pulling off wings and legs. He remarked that the larva had no posterior aperture, and that the waste of the body was stored for two years or more, to be deposited by the imago shortly after emergence, much in the same way as was done by bees and internal parasites.

Mr. West (Greenwich) exhibited the orthopteron, *Thamnotrizon cinereus;* a specimen of *Forficula auricularia* var. *forcipata* from Dartford; and *Vespa germanica*. On behalf of Mr. Carr he exhibited the rare coleopteron, *Trichius fasciatus*, from Mid-Wales.

Mr. R. Adkin exhibited a specimen of *Agrotis exclamationis*, that was taken in his garden at Lewisham on the occasion of the Entomological Club Meeting there on June 17th last; also another of the same species taken at the same place a few days later, in which the reniform and orbicular stigmata were united.

Mr. West, of Ashtead, referred to a cat, which appeared to have an affection of the eye-lid, which did not yield to bathing with water. After a time an object gradually worked out, and, on examination under the microscope, was found to be the awn of barley, which he exhibited.

Mr. Dunster exhibited *Colias edusa*, from Weymouth and Lyme Regis; *Pyrameis atalanta*, *P. cardui*, and *Vanessa io*, from Crewkerne; together with *Mesoleuca ocellata*, *Ania emarginata*, *Epione apiciaria*, etc., from the same locality.

Mr. Carr exhibited the eggs of *Boarmia gemmaria*, which were laid in a chip box and thrust in between the eggs of one of the "thorns," which had previously oviposited in the box.

Mr. Turner exhibited specimens of the "rose" beetle (*Cetonia aurata*), found in numbers on a thistle at Cortina d'Ampezzo; specimens of *Cassida equestris*, bred from larvæ and pupæ found on the shores of Konig See, N. Tyrol, on a yellow-flowered *Salvia*, and the beautiful pedicelled nest of a wasp (*Polistes gallica*), found on a wall in the valley leading to Pieve di Cadore from Cortina.

Mr. Sich remarked on the occurrence of a Tineid, probably *Tineola biselliella*, which he had observed in some numbers in the cage of the Indian rat-snakes at the Zoological Gardens.

Mr. E. Step read the following note:—

"I wish to put on record a small contribution to the mass of evidence already accumulated, which exhibits the wasp as an intelligent insect. In my garden is a flourishing colony of *Vespa germanica*, and for a nesting hall they have excavated into a bank of earth thrown up for rock-garden purposes. The entrance is on the south side, and only a few inches from the high wall of twine-netting that bounds the tennis court at that end. This netting is of inch-and-a-quarter mesh; and whilst the wasp colony was small it did not appear to interfere greatly with their coming and going. The wasps on leaving the nest divided into three parties—two turning sharply to right and left respectively and flying N.E. and N.W. to the upper branches of a row of poplars. Among their captures from the poplars I could frequently detect small green larvæ about an inch long. The third party went forward through the netting, and over the tennis court. Now, in returning to the nest these had no difficulty, they flew straight through at full speed; but in leaving the nest most of them boggled at it, and dodged about before deciding which of the spaces to pass through. By the middle of August, when the number of the workers had enormously increased, the net had become an obstacle, and the cause of much confusion between the coming and going streams. On August 18th I observed that three or four workers were hanging to the threads of the net as though resting. Closer observation showed that they not only clung with their feet, but that the thread was gripped by the mandibles, and that the wasps were revolving on this axis. Then it struck me that they might be cutting the net, and I found that several of the meshes had already gone. I watched the work at intervals during that and the next two days, and several times saw a worker give up and retire into the nest, her place being taken a minute or so later by another worker from the nest. Of course, it may have been the same one returned, but I fancy they were working on the spell system. On the third day the task was complete, a hole a foot in diameter having been made, through which the outgoing workers could shoot swiftly, straight from the entrance hole.

"The gap was neither round nor square, nor any other definite shape, the result being achieved piece-meal. A good deal of unnecessary labour had been expended, owing to their efforts not being restricted to the circumference of the projected hole. Wishing to make sure that the work had been deliberately undertaken with a definite purpose, I covered the opening with a sound piece of net, on August 24th. I waited until 7.30, when the outward stream had ceased for the night, and the inward stream had dwindled considerably. At 8.30 a.m., on the 25th, there was a new hole about half the dimensions of the old, and only one worker was then engaged. Before mid-day this one had retired. The wasps had evidently come to the conclusion that so large a hole as the first was not necessary; and I agreed with them. The same evening I again covered up the opening with another piece of netting, and next morning two artificers were at work on it. At mid-day there were two holes, one above the other, each about three inches across. There I am content to leave the matter, feeling assured that the work was done deliberately with a definite end in view."

[No further obstruction was put in their way, and these two holes sufficed to the end of the season.—E. S.]

SEPTEMBER 11*th*, 1913.

Mr. Ashdown exhibited the imago of *Hyles euphorbiæ*, bred by him on September 3rd from a larva taken at Aigle, Switzerland, on June 29th, 1913.

Mr. Turner exhibited a larva of *Mamestra* (*Hadena*) *pisi*, found in his garden at New Cross, and which fed readily upon Michaelmas daisy, upon which it had, presumably, been feeding when captured.

Mr. W. G. Sheldon exhibited a collection of *Heterocera* taken by him in Arctic Sweden and Arctic Norway during the summers of 1911-12. It comprised eighteen species, of which ten were also in the British Fauna. Species which here, and in the Alps, were high mountain forms, were, in these Arctic regions, found nearly down to the sea-level, *e.g.*, *Plusia hochenwarthi*, *Anthrocera exulans* var. *vanadis*, *Psodos coracina* (*trepidaria*), etc. Many of the forms were smaller than their more southern representatives, *e.g.*, *Xanthorhoë* (*Melanippe*) *montanata*, *Entephria* (*Larentia*) *cæsiata*, *Coremia munitata*, etc. Some responded to their surroundings in the chalky areas of the mountains and became light, *e.g.*, *Gnophos sordaria*. *Eulype* (*Melanippe*) *hastata* was a somewhat darker form than that found in Britain. He referred to the fact that some species laid their eggs between 12 and 1 a.m., and that it was quite possible to collect, especially Geometers, at midnight. Besides the species mentioned above, Mr. Sheldon exhibited *Anarta zetterstedtii*, *A. cordigera*, *A. melanopa*, *A. richardsoni*, *A. melaleuca*, *Pacnobia hyperborea* (*alpina*), *Xanthorhoë* (*Melanippe*) *fluctuata*, *Cidaria frigidaria*, and *C. polata*.

Mr. West (of Greenwich) exhibited examples of the wasps *Vespa germanica*, *V. sylvestris* and *V. vulgaris*, and the points of differentiation were demonstrated.

Mr. Curwen exhibited a series of *Loweia alciphron* var. *gordius*, from Iselle, showing considerable variation in the intensity of the colour, and a short series of the local *Loweia amphidamas* from Caux.

Mr. Step exhibited females of *Vespa germanica* and *V. vulgaris*, set so as to show the different markings of the clypeus of the two species, which may be described as, in *V. vulgaris*, the so-called "anchor mark," really like a turf verge-cutter, in black; whilst *V. germanica* has simply three black dots arranged pyramid fashion. In the worker of *V. vulgaris* the turf-cutter illusion is spoiled by the handle being continued below the blade to the base of the clypeus; whilst in *V. germanica*, the upper dot is replaced in the worker by a black bar, extending to the top of the clypeus. These distinctions are correlated with differences in the banding of the abdomens.

Mr. F. B. Carr exhibited a large spider which he had found in some numbers on heather at Crockham Hill. It was found to be *Epeira quadrata*. He stated that he had recently met with *Noctua glareosa* commonly, *Agrotis agathina* fairly commonly, and *Asphalia diluta* commonly at sugar.

Mr. Sich reported that *Carpocapsa pomonella* was abundant this autumn.

Mr. Step exhibited larvæ of the saw-fly, *Cladius viminalis*, which, in closely marshalled ranks, were attacking poplar leaves. The eggs, he stated, were deposited in curved slits in the petioles of the leaves.

Mr. Tonge reported that the larvæ of *Nonagria typhæ* at Deal were very extensively ichneumoned this season. Out of a large number of pupæ obtained, only five were not attacked.

Mr. Smith reported *Phryxus livornica* as again occurring at light in South Cornwall; the dates June 1st and September 3rd. In July *Agrotis lunigera* occurred in the same locality in some numbers, and three specimens of *Lucania vitellina* had been obtained by him. This was the third season in which *P. livornica* had been obtained there.

SEPTEMBER 13*th*, 1913.

FIELD MEETING AT WORMS HEATH, NEAR WARLINGHAM.

Conducted by B. H. SMITH, B.A., F.E.S.

Sixteen members attended this afternoon's field meeting. Worms Heath lies about one mile on the Westerham Road beyond the village of Warlingham, and consists of a high plateau of gravel plentifully covered with birch, scrub-oak, broom and heather. It is interesting, apart from entomology, for a dew-pond and remains of dwellings of a neolithic race of man. The afternoon did not result in any lepidoptera being captured worthy of record except a nice variety of *Rumicia phlaeas*, taken by Mr. H. Moore, in which the usual markings of the forewings were replaced by lines. Two of the party diverged to a distant clover field for *Colias edusa*, but were not fortunate enough to see it. Several bright yellow butterflies, however, they were assured by a farm labourer, had been there earlier in the day. A pleasant stroll back through Slines Oak Wood, and along the slopes of the downs, brought the party back to Warlingham, where they were hospitably entertained by Mr. Smith at his residence.

SEPTEMBER 25th, 1913.

Exhibition of Lantern-slides.

Mr. C. B. Williams exhibited a lantern-slide of an adult male Embiid, species unknown, bred from a larva collected by Mr. Buxton in Algeria.

Mr. Dennis exhibited slides of flower-groups in their natural surroundings, of a field of fuller's teasel, and of the shed where the cut-plants were hung up to dry on poles.

Mr. Main exhibited slides of a larch sawfly (*Nematus erichsoni*), and described the details of the life-history of the species, which was the cause of much damage in the woods near Manchester. The cocoons were made in the ground under the trees and were no doubt preyed upon considerably by mice and voles, while birds helped to keep the pest in check by eating the larvæ. At present little had been done to control them by parasites, but an attempt is being made to introduce them. The eggs were laid at the ends of the shoots between the needles by the females, which were mostly parthenogenetic. The males were extremely rare. The twigs attacked assumed gradually a curved shape, and extensive defoliation was frequently caused. The larvæ spun cocoons and rested thus throughout the winter, not turning to pupæ until the spring.

Mr. C. W. Colthrup exhibited lantern-slides of the eggs and nests of seabirds.

Mr. Carr exhibited photographs, taken by Mr. Step, of the large spider, *Epeira quadrata*, exhibited by Mr. Carr at the previous meeting.

Mr. W. J. Lucas exhibited specimens of the grasshopper

Gomphocerus rufus, and contributed the following note:—"The specimens were taken on Bookham Common on September 9th last, and since fed on grass. The box contains a male; a female (bred from a nymph); and a nymph. Bookham Common is the only place in which I have taken the species; but it occurs at Box Hill, and, I have no doubt, in other places in Surrey."

Mr. C. B. Williams exhibited a piece of bark, on the inner-side of which the larva of the Embiid, from Algeria, had lived in small tunnels of silk spun by it from silk-glands situated on the front legs.

Mr. L. W. Newman exhibited specimens of *Agriades coridon* from Herts, including a female example in which one pair of wings were dusted with blue-scaling, and much smaller in size than the opposite pair, which are of normal colouring; and a few ab. *semi-syngrapha* from the same locality. Mr. Rowland-Brown said that he once captured the last named form on the Chiltern Hills, but had never since been able to obtain another. Mr. Newman also called attention to the excessive proportion of females to males.

Mr. Gibbs called attention to the exhibit, by Mr. J. H. Durrant, in the Hall of the Natural History Museum, S. Kensington, of the destruction of army-biscuits in depôt caused by *Ephestia kühniella*.

Mr. Curwen, exhibited a number of specimens of *Brenthis euphrosyne* from various localities, and said that it was usually stated that specimens from high elevations were dark and small. Those he exhibited from Caux, above Montreux, only 1,220 feet, were small and light; from the Simplon, about 4,500 feet, they were light and large; and those from Zermatt, nearly 6,000 feet, and from the Bernese Oberland, 5,000 feet, were larger than the English specimens.

Mr. H. Moore exhibited the aberration of *Rumicia phlaeas*, which he had captured on the occasion of the Field Meeting at Worms Heath, in which the spots on the forewings, both upper and under-side, were considerably emphasized in extent. Probably the specimen was referable to the form named ab. *magnipuncta*.

Mr. West (Greenwich) exhibited a series of the coleopteron, *Dacne rufifrons*, taken from the fungus, *Polyporus hispidus* exhibited on August 14th by Mr. Edwards. He also showed a short series of *Cassida vittata*, from Dartford, taken by sweeping.

Mr. Lucas said that *Colias edusa* had been in plenty at Box Hill, and that *C. hyale* has been taken at Folkestone. Specimens of *C. edusa* ab. *helice* had also been captured.

Mr. Colthrup had noted many *C. edusa* during a stay of six weeks at Margate this autumn.

OCTOBER 14*th*, 1913.

FUNGUS FORAY, OXSHOTT.

Conducted by E. STEP, F.L.S.

Owing to the long-continued drought of the latter part of the summer and early autumn, fungi were by no means so abundant as usual. Some rain in the afternoon somewhat curtailed our activities. Mr. Edwards again kindly kept account for me of the species identified, and has supplied me with the following list:—

Amanita muscaria var. *citrina*, *A. rubescens*, *A. pantherina*, *Laccaria laccata*, var. *amethystina*, *Collybia maculata*, *C. radicata*, *Lactarius blennius*, *L. torminosus*, *L. quietus*, *L. subdulcis*, *Russula adusta*, *R. nigricans*, *R. virescens*, *Cantharellus aurantiacus*, *Paxillus involutus*, *Pleurotus fluxilis* (a resupinate species, growing on *Boletus scaber*), *Coprinus truncorum*, *Boletus bovinus*, *B. olivaceus*, *B. luteus*, *B. æreus*, *B. scaber*, *Leotia lubrica*, *Fomes annosus*, *Polystictus perennis*, *Tremellodon gelatinosum*, *Thelephora laciniata*, *Sparassis crispa*, *Lycoperdon perlatum*, *Cordyceps ophioglossoides*.

Some beating and sugaring was done, but I have received no lists of captures, except that Mr. Browne reports larvæ of *Mamestra contigua* (full-fed) and of *Pachys betularia*. Larvæ were also taken of *Ellopia prosapiaria* (*fasciaria*) (ichneumoned) and of the pine sawfly (*Lophyrus pini*). The orthopteron, *Stauroderus bicolor*, was abundant. I have since received a note from Mr. Buckstone, who noted six *Thera firmata* on tree-trunks, with *T. variata* in abundance. By beating he obtained larvæ of *Drepana lacertinaria*, *D. falcataria*, *Lophopteryx camelina*, *Notodonta dromedarius*, *N. ziczac*, *Cabera pusaria*, *C. exanthemata*, *Semiothisa liturata*, *Bupalus piniaria*, *Ephyra pendularia*, etc., but only in very small numbers, except *B. piniaria*, which was common. Subsequently he obtained the following species at sugar: *Miselia oxyacanthæ*, common, *Phlogophora meticulosa*, common, *Scopelosoma satellitia*, common, *Amathes helvola* (*rufina*), common, *Amathes lychnidis* (*pistacina*), *Cerastis vaccinii*, common, *Amathes circellaris* (*ferruginea*), *Noctua c-nigrum*, and *Agrotis saucia*.

OCTOBER 9*th*, 1913.

It was announced that a large collection of British macro- and micro-lepidoptera had been added to the Society's Collections by Mr. W. G. Dawson, of Abbot's Morton, Worcester.

Mr. W. J. Lucas read a Paper :—"The Short-horned Acridians of the British Isles," and illustrated his notes with numerous lantern slides (Printed on page 26.)

Mr. W. J. Ashdown exhibited a number of lepidoptera taken by him in Switzerland in June and July, 1913, including *Argynnis niobe* var. *eris*, *Brenthis daphne*, *Chrysophanus hippothoë*, *Erebia stygne*, *Klugia spini*, *Nordmannia acaciæ*, about a dozen species of "blues," *Nemophila plantaginis* var. *hospita*, *Rhodostrophia vibicaria*, and *Thyris fenestrella*.

Mr. Colthrup exhibited a snail-shell, *Helix virgata*, from which he had bred a dipteron, no doubt a parasite on the snail. This was afterwards named by Mr. Wainwright as *Onesia* (*Melinda*) *cognata*, Mg.

Mr. H. W. Andrews exhibited two females of *Syrphus guttatus*, Fln., a scarce dipteron taken at Bexley on August 4th.

Mr. E. Step exhibited living examples of the ant-nest isopod, *Platyarthrus hoffmanseggii*, found in the nest of *Formica fusca*, in his garden at Ashtead. First determined as British about 55 years ago, it was long considered to be very rare and restricted to the nests of a very few species of ants. Wasmann, however, records finding it in connection with seventeen species, and in this country Donisthorpe has found it in the nests of about a dozen species. I am not at present sure whether Ashtead is a new locality, but Donisthorpe has found it certainly as near as Box Hill. Stebbing refers to it as "slow-moving," but the specimens exhibited will demonstrate that this is scarcely correct. The ant appears to treat it with indifference, but the isopod apparently respects the ant and avoids getting in its way.

Mr. W. West, L.D.S., exhibited enlarged photos of *Platyarthrus*, showing dorsal and ventral aspects, from specimens provided by Mr. Step.

Mr. Curwen exhibited specimens of *Syntomis phegea* and its var. *pfluemeri*, in which the white spots of the forewings are much reduced in size and only five in number, from Pallanza and Iselle, at the southern side of the Simplon, together with living larvæ of the species. He also showed specimens of *Naclia ancilla* from the same locality.

Mr. Newman exhibited long series of picked forms of *Melitæa aurinia*, bred from County Clare, Ireland, showing considerable minor variation, but, considering the number bred, only a very small percentage was aberrant. A few larvæ were taken from every nest met with, so that the range of broods was somewhat extensive. A similar exhibit was made of Scotch specimens from Oban, showing similar results.

OCTOBER 23*rd*, 1913.

Prof. E. B. Poulton, F.R.S., President of the Linnean Society, gave an account of the Mimicry exhibited by the Nymphalines of North America, illustrating his remarks by specimens and lantern slides. (See page 35.)

Mr. W. J. Kaye exhibited a collection of the *Sphingidæ* found in the island of Trinidad :—

ACHERONTIINÆ.	*Herse cingulata*,	*Cocytius antæus* sub-sp. *medon*,
	Protoparce sexta sub-sp. *paphus*,	
	P. diffusa sub-sp. *tropicalis*,	*P. albifuga*,
	P. rustica,	*P. corallina*,
	P. florestan,	*P. ochus*,
	P. lefebvrei,	*P. hannibal*.
AMBULICINÆ.	*Protambulyx strigilis*,	*Amplypterus palmeri*,
	A. gannasceus.	
SESIINÆ.	*Pseudosphinx tetrio*,	*Isognathus scyron*,
	Erinnyis lassauxi,	*E. œnotrus*,
	E. ello,	*E. crameri*,
	Pachylia ficus,	*Madoryx oiclus*,
	M. bubastus,	*Leucorhampha triptolemus*,
	Hemeroplanes calliomenae,	*Epistor gorgon*,
	E. lugubris,	*Perigonia lusca*,
	Sesia tantalus,	*Sesia ceculus*.
PHILAMPELINÆ.	*Pholus anchemolus*,	*P. phorbas*,
	P. satellitia sub-sp. *licaon*,	*P. fasciatus* (*vitis*),
	P. labruscæ.	
CHÆROCAMPINÆ.	*Xylophanes pluto*,	*X. tyndarus*,
	X. torsa,	*X. neoptolemus*,
	X. thyelia.	

Mr. W. G. Sheldon exhibited a series of *Plebius zephyrus* of the sky-blue form, var. *hesperica*, and, for comparison, specimens of the ordinary violet-blue form, var. *lycidas*, from Switzerland; the ab. *rufolunulata* of *Agriades thetis*, in which red spots appear in the margin of the hindwings; specimens of *Agriades thersites* and examples of *Glaucopsyche cyllarus*, all from Albarracin, Spain, 1913.

Dr. Chapman remarked that he was of opinion that *A. thersites* was attached to sainfoin in nature.

Mr. L. W. Newman exhibited a large number of lepidoptera collected and bred from Co. Clare, Co. Cork, and Killarney. Among the most interesting species were extreme light *Aplecta nebulosa*, *Nemeophila plantaginis* from Co. Clare; extreme dark *Luperina* *cespitis*, and *L. testacea* from Co. Cork; very dark *Hipparchia semele* and *Aphantopus hyperantus*, with permanent spots on upperside and underside of a greenish shade, both from Killarney; and *Ægeria scoliæformis*, captured at Killarney. In Co. Clare many species turned up in small numbers, among them *Triphæna subsequa*, bred from larvæ, *Mamestra contigua*, *Stilbia anomala*, yellowish, *Spilosoma menthastri*, *Leptosia sinapis*, *Cupido minimus*, etc. Larvæ collecting in Cork produced *Dianthœcia capsophila*, *D. luteago* var. *barrettii*, *Cucullia absynthii*, *Hipocrita jacobææ*, *Macrothylacia rubi*, etc. *Aglais urticæ* var. *polaris* were bred from larvæ from Cork. The weather from April to the end of September (the time spent in Ireland) proved very bad, wind and rain prevailing nearly all the time, with few really fine days till September. Lepidoptera were very scarce, and the natives even remarked how few butterflies were about compared with other years.

Mr. A. E. Tonge exhibited the fungus, *Clavaria inæqualis* from Tunbridge Wells, and a male specimen of *Argynnis aglaia* with confluent spots forming a conspicuous blotch on the forewings.

NOVEMBER 13*th*, 1913.

Prof. W. Bateson, F.R.S., gave an address on the "Problem of Species which overlap Geographically," illustrating his remarks with numerous specimens and lantern slides.

Birds of the genus *Colaptes* were exhibited from North America. One form inhabits the north and eastern area, another the west and southern area, leaving a narrow area between in which a large proportion of crosses of these two forms of many degrees were obtainable. The peculiar distribution of the sugar-birds in the West Indies was another instance, and similar examples of this peculiar overlapping of distribution in the cases of *Argynnis adippe*, *Argynnis niobe*, the North American species of *Limenitis*, the *Coracyas*, or roller-bird of N.E. India, *Pararge egeria* and var. *egerides*, *Pieris napi*, etc. Attention was called to the fact that it was very rare to find a definite recurrent form arise in the area of the overlap, and the results of the crossing of the forms were of all degrees of intermediate blending of characters. The question to be discussed was: What keeps geographical forms, in apparently similar areas, apart?

A considerable discussion took place.

Mr. Newman exhibited long and very varied series of *Zonosoma annulata* (*omicronaria*) and of *Z. pendularia*, including many dark aberrations, and also a series of the hybrid from *pendularia*, female, and *annulata*, male, showing well the characteristics of the two species.

NOVEMBER 27*th*, 1913.

ANNUAL EXHIBITION OF VARIETIES, ETC.

Mr. West (Greenwich), the Hon. Curator of the Society, had placed fifteen drawers of the Society's reference collections on the tables, and reported that he had incorporated the corresponding portions of Mr. Dawson's contribution.

Dr. T. A. Chapman exhibited a nearly black *Argynnis aglaia*, from Le Lautaret, taken on July 31st, 1913; an *Aricia medon* (*astrarche*) with the discal spots merging in the marginal ones, especially on the hindwing; it was taken on May 25th, at Pallanza; and a specimen each of *Agriades thersites*, *Polyommatus icarus* ,and *P. icarus* var. *icarinus*, with diagrams to show the different alignment of spots on the undersides in the two species.

Mr. Edwards exhibited the fungus *Trametes gibbosa*, from an old stump in the grounds of Morden College, Blackheath; and *Clavaria crispula*, which had been growing on a wall in his garden at Blackheath. Cooke and Massee both give trunks of trees as the habitat of the latter. He also showed a large number of *Heterocera*, from Burmah and India.

Mr. H. Moore exhibited specimens of the large and rare *Papilio hecatæus*, from Guadalcamar in the Solomon Islands.

Mr. W. Schmassmann exhibited a series of varieties in the males of *Ornithoptera hecuba*, some showing from one to four golden submarginal spots on hindwings. One form had no golden subcostal spot, and one specimen had the subcostal area covered with black scales, leaving only a minute trace of the usual green patch. He also showed a pair of the gorgeous *Orn. alexandræ*, from New Guinea.

The Rev. G. Wheeler exhibited examples of melanic and xanthic aberration. The former were only five in number and consisted of (*a*) an example of *Argynnis niobe* ab. *pelopia*, male, taken on the Steinenalp, above Bérisal, July 25th, 1899; (*b*) *Melitæa phœbe*, female, taken at Pontresina at the foot of the Schafberg, July 24th, 1907; (*c*) *M. varia*, female, taken in the Heuthal, Bernina Pass, July 23rd, 1907; (*d*) *M. cinxia*, female, taken at Aigle, at the beginning of June, 1897; (*e*) *Melanargia galathea*, male, taken at Piano del Pieve, below Assisi, July 17th, 1909, in which the whole of the left hindwing and almost the whole of the forewing were black, there being also black patches on the right forewing; the underside also exhibited marked melanism.

The xanthic specimens consisted of *Argynnis niobe* var. *eris*, from Switzerland, *A. adippe* var. *cleodoxa*, from South Switzerland and Central Italy, *Dryas paphia* var. *dives*, the Algerian form, and *Urbicola comma* ab. *flava*, from Mt. Cubly, above Clarens; in all these the yellow takes the place of silver; in a second box were four specimens of *Callimorpha dominula* var. *persona*, from Roccaraso and Palena (4,000ft.) in the Abruzzi, in which the yellow replaces red, and two of ab. *bithynica*, from Switzerland, in which the white spots of the forewing are replaced by yellow or orange. Other instances of yellow taking the place of white were shown in the type specimen of *Euchloë cardamines*, ab. male *citronea*, where the normally white part of the forewing is suffused with yellow on the underside, and a specimen each of the females of *E. cardamines*, *Anthocharis belia*, *A. simplonia*, and *A. simplonia* var. *flavidior*, in which the hindwings on the upperside were of a dull buff. The exhibitor remarked that this was a common feature in the genus *Anthocharis*, and that he had specimens of *A. belemia* var. *glauce*, *A. falloui*, and *A. tagis* var. *bellizina* in which the same tendency was shown. In the example of *E. cardamines* exhibited, the forewings were similarly affected. The same thing occurs in the genus *Pieris*, especially in *P. rapæ*, *P. napi*, and *P. napi* var. *bryoniæ*. In *P. ergane* the hindwings of the female are normally of a pale canary-yellow.

Mr. Robert Adkin exhibited a series of third brood specimens of *Celastrina argiolus*, together with first and second brood examples for comparison. He said that occasionally one met with odd specimens of *C. argiolus* on the wing in September, and was always in doubt whether they were belated individuals of the summer emergence, or whether they were really third brood specimens, but, in his experience, it was very unusual for the species to produce a third brood. This year, however, there had undoubtedly been a third emergence. On September 11th he collected some 40 larvæ on ivy flower-buds at Eastbourne. Many of them were, as usual at that time of the year, nearly full-fed, and within a week or so pupated, and he quite expected that they would all remain in pupa through the winter, and produce imagines in the following April and May; but on September 29th he was surprised to see three freshly emerged specimens in the breeding cage, and between that date and October 30th six males and ten females came forth, thus clearly showing a partial third emergence. Perhaps the most interesting point in regard to them was that whereas some of the females followed the spring, or first emergence in having the wings with comparatively narrow black borders, others resembled the summer, or second, emergence in regard to the broad black bordering of the wings. The series exhibited for comparison included specimens reared in July and August, 1912, and April and May, 1913, from larvæ collected in June, 1912, and in April and May, 1913, from larvæ collected in September, 1912.

Mr. Adkin also exhibited long series of *Agriades coridon* from various localities, including the South Downs near Eastbourne; the North Downs near Folkestone, Dover, Otford, and Reigate; the Isle of Wight; Hertfordshire and Wiltshire. Speaking generally, variation appeared to be more strongly developed in the series from the North than those from the South Downs, while the *semi-syngrapha* forms of the female from Hertfordshire showed an advance upon either, and in the *syngrapha* form from Wiltshire the extreme was reached. Among the undersides a rayed male from the Isle of Wight was very conspicuous, while at the other extreme were several, both male and female, almost spotless examples, chiefly from Kentish localities on the North Downs, while in the Sussex series the undersides of the females showed a great divergence in the ground-colour.

Mr. R. T. Baumann exhibited series of *Boarmia repandata* from Epping Forest, Durham, Forfar, and Devonshire, those from Durham including var. *sodorensium*, and those from Devonshire var. *conversaria*. He also exhibited specimens of the dark form of *Acidalia virgularia*, which he was giving the Society to place in the reference collection.

Mr. P. M. Bright exhibited a cabinet drawer containing long and very varied series of *Agriades thetis* (*adonis*), males, upper- and undersides; another drawer containing long and very varied series of *A. thetis*, females, upper- and undersides; a small box containing two striking aberrations of *Colias edusa* with upper-wings richly shot with purple, taken near Canterbury this year; a white aberration of *Argynnis paphia*, taken at Holmsley this year; and several aberrations of the undersides of *Polyommatus icarus*, taken at Wye this year.

Mr. Grosvenor exhibited his fine collection of the various British races of *Cœnonympha tiphon*.

Mr. B. S. Curwen exhibited a selection of the species of *Lycænidæ* taken during the last two seasons in England, Switzerland, and N. Italy, in all 21 species, together with the more striking forms and varieties of *Melitæa didyma*, chiefly from the late Mr. J. W. Tutt's collection. The females of the last species were very large.

Mr. L. W. Newman exhibited a long series of *Smerinthus ocellatus*, showing considerable variation in markings and colour, bred Bexley, 1913; long and very varied series of *Amorpha populi*, ranging from extreme cream colour to almost black, with interfrom mediate and rich pink forms, all (except the very dark Scotch) from Bexley, 1913; a series of hybrid *S. ocellatus* males × *A. populi* female, from several broods, variable in ground-colour and prominence of eyespots; all male specimens except two, the female being very rare in this hybrid.

Mr. A. E. Gibbs exhibited a section of his collection of South American butterflies, including many of the brilliant species in the genus Perisama.

Mr. W. E. Sheldon exhibited his series of about sixty *Melitæa desfontanii*, Godt., taken by him this year at Albarracin in Spain; also a series of the beautiful var. *iberica* of *M. aurinia* from the neighbourhood of Barcelona.

Mr. T. W. Hall exhibited a cabinet drawer of *Agriades coridon*, including ab. *obsoleta* in both males and females, ab. *syngrapha* and ab. *semi-syngrapha*, and long series of underside minor aberrations. Another cabinet drawer consisted of *A. thetis* (*bellargus*), with some very pronounced blue females, and including two specimens showing large splashes of the male colouring in the upperwings.

Mr. Hugh Main exhibited frames containing several series of his photographic life-histories, including sets of the tiger-beetle, *Cicindela campestris*, the lace-wing fly, *Chrysopa flava*, the sawfly *Phyllotoma aceris* and the millepede, *Polydesmus complanatus*.

Mr. A. E. Tonge exhibited a series of *Psilura monacha* bred from ova sent to him by Mr. Harrison of Middlesborough, and including specimens of the black form ab. *eremita*: a long series of *Tapinostola concolor*, taken in Northamptonshire; a very fine series, *Epunda lutulenta*, taken this year at Reigate; and long series of three broods of southern forms of *Cidaria truncata*.

Mr. W. J. Kaye, a box of twenty-three "pairs" of the S. America genera *Melinæa* and *Heliconius*. As was well known, species of *Melinæa* were almost invariably to be found with extemely similar species of *Heliconius* in company with them. The various *Melinæa* species were most often the centres of large assemblages of coloured species, which were supposed to form mimetic associations of the Müllerian kind. But they were not invariably the dominant member of the group, and in some cases, as in S. Brazil, *M. ethra* was rather rare, while the similarly coloured *Heliconius narcæa* was common. Similarly *M. mnemopsis* was considerably rarer than *H. mira.* Only one or two species were without their exact counterpart in *Heliconius*. *M. satiris* from Bolivia, and *M. crameri* from British Guiana, were not exactly matched by any species of *Heliconius*. The rare *M. mnasias* and its forms was more like the species of *Ceratinia*, and there was no species of *Heliconius* in the least bit like it. The following is a list of the species of the two genera exhibited.

Melinæa	*mneme*	with	*Heliconius*	*numata.*
,,	*pardalis*	,,	,,	*pardalinus.*
,,	*cydon*	,,	,,	*radiosus.*
,,	*lucifer*	,,	,,	*aurora.*
,,	*phasiana*	,,	,,	*arcuella.*
,,	*messenina*	,,	,,	*messene.*
,,	*mænius*	,,	,,	*euphone.*
,,	*zaneka*	,,	,,	*lenæus.*
,,	*imitata*	,,	,,	*telchinia.*
,,	*mothone*	,,	,,	*aristiona.*
,,	*lilis*	,,	,,	*metalelis.*
,,	*idæ*	,,	,,	*clara.*
,,	*menophilus*	,,	,,	*euphrasius.*
,,	*paraiya*	,,	,,	*robigus.*
,,	*egena*	,,	,,	*silvana.*
,,	*mnemopsis*	,,	,,	*mira.*
,,	*ethra*	,,	,,	*narcæa.*
,,	*chincha*	,,	,,	*timæus.*
,,	*scylax*	,,	,,	*clarescens.*
,,	*messatis*	,,	,,	*ismenius.*

Commander R. S. Gwatkin-Williams, R.N., exhibited the following aberrations of British lepidoptera.

Epinephele jurtina (*janira*), series of five females from South and West Ireland, showing tawny banded hindwings.

Agriades coridon, from Eastbourne, showing type and underside aberration.

Polyommatus icarus, from Broadstairs, male and female types, with underside aberration of each.

Pseudoterpna pruinata, from Clacton, type and reddish variety.

Cidaria truncata, a series showing types from south and west of Ireland, and forms from Achil Island, which may be referable to *C. concinnata*, Prout.

Xanthorhoë montanata, series from mountains, Achil Island, in three of which the centre bar of the forewing is obsolete.

X. sociata, a type from south and west of Ireland, and a form from mountains, Killarney.

Anthrocera trifolii, a series from near Dorking. In this locality over 50 per cent. have the spots confluent.

Apamea leucostigma, from Co. Cork, showing forms prevalent there.

Euchloë cardamines, two females from south-east England, and three females from Co. Cork, the latter having ochreous hindwings, this being the universal type there in the females.

Mr. Chas. Oldham, F.L.S., exhibited two collections of small chalk stones that he had obtained near the entrances of wasps' colonies, and which the members of these had removed when making and enlarging the cavities in which they built their nests. He said that if these stones are too heavy to be removed, they are allowed to gravitate to the bottom of the cavity, only the loose soil and stones not too heavy to carry being removed. The weight of some of the stones lifted was, in proportion to the size of the wasps, very large, and that those exhibited closely approached the limit, was shown by a heap being found at a few inches from the entrance to the nest. These heaps consisted of stones all about the same size, apparently very near the limit of the weight which a wasp was able to support when on the wing. The stones of lesser weight, and the particles of earth, which had also to be removed from the cavity, were not in the heap, and were, presumably, carried to a further distance, just as are the general refuse, dead larvæ, etc.

The talus of stones around a nest of *Vespa germanica* began some two inches from the lip of the hole and covered roughly an area of a semi-circle of two feet radius. They decreased in quantity with the distance, but there was no apparent decrease in their size. Frequent observation of this nest showed him that most of the wasps got away with their burdens, but that those with larger stones nearer the limit of the capacity of their bearer, failed to take wing properly, and landed somewhere within the above area and had, after many vain efforts, to relinquish their burdens.

The nodules were weighed and compared. Ten of the flint nodules gave an average of ·33 grammes (from ·25 to ·38 grammes), and twenty of the chalk nodules gave an average of ·35 grammes

(·32 to ·41 grammes). They were probably drier than when brought to the surface. Six of the wasps were captured and weighed immediately after death, and their average weight was ·076 grammes. The average weight of the thirty stones was ·347 grammes, and, therefore, was 4·5 times the average weight of the wasp. Similar observations were made by him on a colony of *Vespa vulgaris*, and it was found that in the case of that species the average weight of these stone nodules was 3·7 times the average weight of the wasp, a difference, no doubt, due to the wing area of the last-named species being less than that of the first.

Mr. A. W. Buckstone, on behalf of Mr. T. Archer, exhibited a bleached form of *Angerona prunaria*, male, captured at Oxshott, June 28th, 1913; a form of *Bupalus piniaria*, male, showing a very slight yellow colouring on the forewings and an almost complete absence of yellow on the hindwing, captured at Oxshott, June 23rd; and an *Acidalia*, female, which no member present was able to identify with any certainty. Messrs. Adkin and Newman were of opinion that it was a form of *A. bisetata*. It was captured at Oxshott.

Mr. H. Worsley-Wood exhibited the following sets of *Mellinia* (*Xanthia*) *ocellaris* taken in the Thames Valley, in 1911 and 1912. Five typical specimens with an example of *M. gilvago* for comparison. Four ab. *lineago*.—This is the usual form in England. The specimen with the five clearly marked dots on the sub-terminal is apparently of great rarity. Three ab. *intermedia*.—There seem to be no records of the capture of this form, but examples were bred together with both the preceding forms from an *ocellaris*, female, in 1911. He also showed lead coloured males and dwarf examples of *Agriades thetis* (*bellargus*), from near Corfe, August 1911, with two yellow *Brephos parthenias*, from Wimbledon, 1912 and 1913.

The Rev. J. E. Tarbat exhibited two aberrations of *Brenthis euphrosyne*, from Fareham, one suffused generally and the other with some of the black spots merged to form a band; a *Cœnonympha tiphon* (*davus*), from Braemar, with right upperwing malformed; dark forms of *Abraxas grossulariata*, bred, from St. Annes-on-Sea and Huddersfield, those from the latter place being referable to ab. *nigro-sparsata*, the forewings only being entirely black with the exception of small white spots at the inner angle; and a *Cidaria truncata* (*russata*) with a dark, broad central band on the upperwings.

Mr. E. L. Haynes exhibited a series of hybrids from *Selenia* *tetralunaria*, male, × *S. bilunaria* (*illunaria*), female, bred in July, 1913, the brood giving a large preponderance of gynandromorphous specimens; a part of a brood of *Ennomos quercinaria* showing melanic and ochreous varieties from a 1911 typical female; and a series of *Agrotis cinerea* of somewhat large size, from Surrey.

Mr. Hy. J. Turner exhibited a series of *Erebia stygne*, from several continental localities, showing the great range of variation, from the large examples with dark-ground and very rich red bands and well developed ocellations on all four wings, from Mt. Canigou and Eastern Pyrenees, to the form from Murren in which all the wings are almost uniformly black with only slight traces of the eye-spots.

Mr. Sharp exhibited a series of *Colias edusa*, 71 males and 45 females, bred in October, 1913, from ova obtained in August; and a series of eight ab. *helice*, 5 typical females and 31 typical males, bred from ova laid by a captured ab. *helice*.

Mr. Colthrup exhibited a series of *C. edusa*, taken at Eastbourne in July and August, 1913, and at Margate in September, 1913, including two ab. *helice*, and also a series of females taken at Eastbourne in 1912 for comparison; the 1913 females being decidedly smaller, as were also females taken in 1900 and 1902 for comparison.

Mr. Walford Johnson exhibited a series of photographs from life, illustrating his study of the early development of a typical fish. The species was the Scotch salmon, *Salmo salar*. The magnification was six diameters. Fig. 1, taken on February 22nd, showed the ovum on the point of hatching, after incubation in running water for a period probably of something like eight to ten weeks. Fig. 2. The hatching in progress—the creature partly out—the tail being first to escape as in all normal cases. In both figs. the eye is visible through the egg-shell. Fig. 3. The creature —known now as an "alevin"—quite free. The empty egg membrane is also shown torn across. Figs. 3 and 4 show the embryo fish with a thin, almost transparent, body, with blood vessels showing plainly; also the rudiments of all the future fins. Attached to the under-surface of the body, immediately behind the head, is an umbilical or yolk sac crowded with oil globules—the nutriment on which for some weeks the alevin subsists, as it has a mouth fitted only for passing water over the gills. Most of the oil globules are microscopic, but some few are exceedingly large and are orange in colour. The whole creature is pinkish, because it lacks all colour, save that due to these large globules and the blood vessels. The sac is ramified by a network of veins, which all lead into a main artery, which is visible on the surface on the left side. Figs. 5 and 6 show gradual absorption of the sac-nutriment and consequent growth of the body—the fins becoming rayed, and colour forming on the body. Figs. 7 and 8 show a further diminution of the sac and enlargement of the body. The greyish colour becoming stronger and the fins more developed. At this stage also the creature begins to feed on tiny water animals, although the sac is not entirely absorbed. Fig. 9. The fry has lost its sac completely and is in every way a complete fish. The blotches along the sides will ultimately give rise to the zebra marking of the "Parr" or the second stage of the salmon.

Mr. Step exhibited a series of fresh specimens of the discomycetous fungus *Helvella lacunosa*, and pointed out that though the typical colour was described as blackish-grey or dark grey, these few examples showed a gradation from almost black to almost white, and appeared to include the form known as *Helvella fusca*, which was distinguished chiefly by the under surface of the pileus being strongly marked with swollen veins. *Helvella crispa*, the commoner white species, had a stem much thicker at the base, tapering upwards, and extreme forms of the black and white were so distinct that they might be justifiably regarded as separate species; but where these specimens grew it was possible to gather a sufficient number of examples to show a gradual transition from the thick-stemmed white (*crispa*) to the almost black, with narrow, equal stem (*lacunosa*). He strongly suspected that the three "species" named were, after all, only forms of one species.

In the general remarks on the exhibits, several members remarked as to the occurrence of a third brood of *Celastrina argiolus*. That there were frequently three appearances, or an emergence prolonged more or less throughout the summer, most were agreed, but as to there being three successive broods in nature was a matter of doubt up to the present. It was stated by Mr. Rayward that it was not possible to force the species. Dr. Chapman said that its characteristic was to hibernate as a pupa, and from his experience on the continent of Europe, he emphasized the tendency of the insect to be continuously brooded. Mr. Bright said that, in 1911, he noted the species at Bournemouth from March to October; while Mr. Sheldon thought that the question was a matter of locality, the farther south that the species occurred the nearer it attained to continuous broods.

DECEMBER 12*th*, 1913.

Mr. Leonard Tatchell, of Bournemouth, was elected a member.

Mr. W. J. Kaye read a paper, "The *Ithomiinæ*" (see page 38), and illustrated it with a very fine selection of specimens, typical of the various groups of the subfamily.

Mr. T. W. Hall referred to an occurrence of the minute acarus, known as the furniture mite, *Glyciphagus cursor*, introduced into a house with some new furniture; and asked how it might be effectively dealt with. Mr. Williams suggested repeated and thorough fumigation of furniture rooms. Mr. Noad Clark suggested the application of a solution of corrosive sublimate in methylated spirits. Several members thought that the application of the latter would be detrimental to any textile fabric, and that it would be dangerous if children were accustomed to use the rooms.

Mr. Step exhibited a box of diptera, chiefly *Syrphidæ*, including *Syrphus ribesii*, *Catabomba pyrastri*, *Eristalis pertinax*, *E. tenax*, *Helophilus pendulus*, *Mesembrina meridiana*, etc., taken at the flowers of Michaelmas daisy and ivy in October and November.

Mr. Robert Adkin exhibited a series of *Nemeophila plantaginis*, reared from ova obtained from a moth taken by Mr. Lachlan Gibb in the hills above Grasmere, Westmoreland, at, he believed, an elevation of about 2,000 feet. The ova were deposited on July 3rd and 4th, 1912, and hatched on the 13th; the young larvæ fed readily on plantain, one of them growing much faster than the others. This one pupated during the last week in September, and produced a female imago on October 27th. All the other larvæ fed occasionally whenever the weather was warm and sunny, until well into October, and appeared to make no special preparation for hibernation, but simply rolled themselves up, fell to the ground and lay there, usually several together, during the winter. Towards the end of March, the sunshine appeared to revive them, and they were frequently on the move whenever it was really bright. They began to feed again, very sparingly, until the middle of May; but from that time on they ate ravenously, were all full-fed by the end of that month, and the moths emerged between June 5th and 18th. The series showed little variation, except that the moth reared on October 27th had red hindwings, and in this respect agreed with specimens received from the Orkney Islands.

Mr. Newman said that he had never met with the species in autumn, nor did he know a previous record of the red form from

Cumberland and the South. His larvæ usually spent the winter, in individual nests among moss.

Mr. R. Adkin exhibited four bred specimens and a preserved larva of *Mellinia (Xanthia) ocellaris*, received for the Society's Cabinet from Mr. H. Worsley-Wood, who says:—"It is but a trifling return for three very pleasant evenings spent as a guest in their rooms during the past twelve months."

Mr. Curwen exhibited a series of *Erebia ceto* near the form ab. *obscura*, from the Simplon Pass. They were mainly from Berisal and the Laquinthal, quite a contrast to the brilliantly yellow-marked form taken at Macugnagna, but not so dark as the Mürren *obscura* form.

Mr. Carr exhibited (for Rev. F. M. B. Carr) a collection of lepidoptera made in Staffordshire and Mid-Wales during the past year, including some nicely marked *Acidalia marginepunctata*, some with dark suffusion, and a beautifully banded form of *Melanippe tristata*, in which the outer-marginal and basal areas were very dark.

REPORT OF THE ANNUAL CONFERENCE OF DELEGATES OF CORRESPONDING SOCIETIES TO THE BRITISH ASSOCIATION held on September 11th and 16th, 1913.

The Eighty-third Annual Meeting of the "British Association for the Advancement of Science," was held in Birmingham from Wednesday, September 10th, to Wednesday, September 17th, 1913, and the usual "Conference of Delegates of Corresponding Societies" was held on the afternoons of Thursday 11th and Tuesday 16th, in the Library of the Birmingham Natural History and Philosophical Society, which had been placed at the disposal of the Delegates by the courtesy of the Council of that Society. It was attended by your delegate, Mr. Robert Adkin, who reports:—

The Conference was opened by the reading of the Report of the Committee.

The Chairman, Dr. P. Chalmers Mitchell, F.R.S., then delivered an address, his subject being the "Utility of Selection." It was a most interesting and instructive dissertation, and is commended to your attention. A copy is attached to this report, and will be placed in the library for the convenience of members.

The opinion of the Delegates was then sought as to the place of meeting of the Conference in 1914. The Association will hold its meeting in Australia, and, in the ordinary course of things, when the Association meets in a distant part of the Empire, the Conference of Delegates of Corresponding Societies would be held in London at some time during the autumn. But it so happens that the French Association for the advancement of Science proposes to meet at Havre, an important town of France, adjacent to the coast of Britain, and they have issued a cordial invitation to the Delegates to hold their Conference there, and one of their members who was present, spoke very encouragingly in support of the invitation. The matter was discussed at considerable length, and it was eventually decided to accept the invitation, subject to the approval of the Council.

The other subjects brought before the Conference were "Scientific Societies and the Control of Plant Extermination," introduced by Mr. A. R. Horwood, and "The Best Means of Preventing the Extinction of Local Species," by Mr. R. H. Whitehouse. Both subjects were somewhat warmly discussed, but without any very enlightening results.

JANUARY 8*th*, 1914.

Mr. W. J. KAYE, F.E.S., *Vice-President* in the chair.

Messrs. D. H. Gotch, of Northampton, A. Leeds, of Knebworth, W. N. Jackson, of Wimbledon, and T. H. Archer, of Southfields, were elected members.

Mr. Hugh Main gave an interesting account of his holiday in Switzerland, in 1913, entitled, "The Brunig Road," and illustrated his address with a large number of lantern slides, mainly from his own photographs of the wild life of that region. (See page 49.)

Mr. Step exhibited a photograph, made by Mr. West (Ashtead), of the "furniture mite" *Glyciphagus cursor* (*Acarus domestica*).

JANUARY 22nd, 1914.

ANNUAL GENERAL MEETING.

Mr. A. E. Tonge, *President*, in the chair.

The first meeting, held at seven oclock, was devoted to the business of the Society.

The Balance Sheet was read by Mr. Russell, one of the Auditors, and was adopted by the meeting. It was an eminently satisfactory one (see page xvi.).

The Report of the Council (see page xi.), was read and adopted by the meeting.

The President declared the following gentlemen duly elected as Officers and Council for 1914-15.

President.—B. H. Smith, B.A., F.E.S.

Vice-Presidents.—A. E. Gibbs, F.L.S., F.Z.S., F.E.S., and A. E. Tonge, F.E.S.

Treasurer.—T. W. Hall, F.E.S.

Librarian.—A. W. Dods.

Curator.—W. West (Greenwich).

Editor.—E. Step, F.L.S.

Hon. Secretaries.—Stanley Edwards, F.L.S., F.Z.S., F.E.S., and H. J. Turner, F.E.S.

Council.—R. Adkin, F.E.S., J. Platt Barrett, F.E.S., F. Noad Clark, C. W. Colthrup, B. S. Curwen, W. J. Kaye, F.E.S., N. D. Riley, F.E.S., W. G. Sheldon, F.E.S., and A. Sich, F.E.S.

The President then read the Annual Address (see page 55).

Votes of thanks were passed to the President, Treasurer, Officers, Council and Auditors for their work during the year.

ORDINARY MEETING.

Mr. B. H. Smith, *President*, in the chair.

Mr. L. W. Newman exhibited a small female of *Leucania pallens*, with three antennæ developed, one of which was bifid towards the tip, and thicker than either of the other two. Apparently this antenna, which was thicker and bifid, was formed by the anastomosing of two antennæ. The specimen was taken at sugar by the Rev. W. Beecher, near Newark.

Mr. Edwards exhibited, on behalf of Mr. R. Adkin, the fossil guard of a Belemnite, *Belemnites nitidus*, from Swindon, where it occurs commonly, in the Kimmeridge clay (Jurassic Epoch).

These cephalopods have a funnel, and behind this a small bag with a tube which leads to the funnel; this bag is filled with a carbonaceous substance which, as known in living *Cephalopoda*, can be ejected in the form of a dark ink, which serves to obscure the water, and protect the animal in its flight from an enemy. The ink bag is often found in these fossils, and its contents can still be used as a pigment (sepia).

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CORRIGENDA.

Page 64, line 5, *for* Diastremmena marmorata *read* Tachycines asynamorus. (See "Entom. Rec.," xxvi, 140.

Page 106, line 32, *for* gall-fly *read* fungus.

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1915 COCKAYNE, E. A., M.D., F.E.S., 16, Cambridge Square, W. *l.*

1899 COLTHRUP, C. W., 141, E. Dulwich Grove, S.E. *l, ool, orn.*

1907 COOTE, F. D., 25, Pendle Road, Streatham, S.W. *l, b.*

1909 COULSEN, F. J., 17, Birdhurst Road, Colliers Wood, Merton. *l.*

1902 COWHAM, F. W., 118, Minard Road, Hither Green, S.E. *l.*

1911 COXHEAD, G. W., 36, Linthorpe Road, Stamford Hill, N. *c.*

1899 CRABTREE, B. H., F.E.S., Cringle Lodge, Levenshulme, Manchester. *l.*

1885 CROKER, A. J., 1045, McClure St., Victoria, British Columbia. *l.*

1898 CROW, E. J., 26, Tindal Street, North Brixton. *l.*

1910 CURWEN, B. S., 17, King Edward's Grove, Teddington. *l.*

YEAR OF ELECTION.

1888 DAWSON, W. G., F.E.S., The Manor House, Upper Wick, Worcester. (*Life member.*) *l.*

1900 DAY, F. H., F.E.S., 26, Currock Terrace, Carlisle. *l, c.*

1912 DEXTER, S., 13, Bankwill Road, Lee, S.E.

1889 DENNIS, A. W., 56, Romney Buildings, Millbank, S.W. *l, mi, b*

1901 DODS, A. W., *Hon. Librarian*, 88, Alkham Road, Stamford Hill. *l.*

1912 DUNSTER, L. E., 44, St. John's Wood Terrace, N.W. *l.*

1904 EAST, F. J., 69, Cazenove Road, Stamford Hill. *l.*

1886 EDWARDS, S., F.L.S., F.Z.S., F.E.S., *Hon. Sec.*, 15, St. German's Place, Blackheath, S.E. *l, el.*

1914 EMMETT, C. P., F.E.S., Messrs. Cox & Co., Charing Cross, S.W. *l.*

1886 ENOCK, F., F.L.S., F.E.S., F.R.M.S., F.R.H.S., 13, Tufnell Park Road, Holloway, N. *d, mi.*

1887 FLETCHER, W. H. B., M.A., F.E.S., Aldwick Manor, Bognor, Sussex. (*Life member.*) *l.*

1889 FORD, A., South View, Irving Road, West Southbourne, Bournemouth, Hants. *l, c.*

1907 FOUNTAINE, Miss M. E., F.E.S., 1, The Studios, Sherriff Road, West Hampstead, N.W. *l.*

1912 FREEMAN, C. N., The Hollies, Hatherley Road, Sidcup, Kent.

1886 FREMLIN, Major H. S., M.R.C.S., L.R.C.P., F.E.S., The Elms, Kingsbury, N.W. *l, mi.*

1912 FROHAWK, F. W., M.B.O.U., F.E.S., Stanley House, Park Road, Wallington, Surrey. *l, orn.*

1915 FRYER, GORDON, L. D. S., 52, London Road, Twickenham. *l.*

1914 FRYER, J. C. F., Craven House, Northumberland Av., S.W. *l.*

1911 GAHAN, C. J., M.A., F.E.S., British Museum (Natural History), South Kensington. *c.*

1912 GARDNER, J. E., 204, Evering Road, Upper Clapton, N.E.

1884 GIBB, L., The Shrubbery, 38, Blackheath Park, S.E. (*Life member.*) *l.*

1909 GIBBS, A. E., F.L.S., F.Z.S., F.E.S., *Vice-President*, Kitchener's Meads, St. Albans, Herts. (*Life member.*) *l.*

1913 GIBBS, Mrs. A. E., Kitchener's Meads, St. Albans, Herts.

1908 GOFFE, E. R., 160, Ramsey Drive, Westcliff-on-Sea, Essex. *l.*

1908 GREEN, E. D., 17, Manor Park, Lee, S.E. *l.*

1914 GOTCH, W. D. H., Bassingbourne, Abington, Northampton. *l.*

YEAR OF
ELECTION.

1888 HALL, A. E., F.E.S., F.R.H.S., Cranfield House, Southwell, Notts. *l.*

1884 HALL, T. W., F.E.S., *Hon. Treasurer*, Stanhope, the Crescent, Croydon, Surrey; and 61, West Smithfield, E.C. *l.*

1891 HAMM, A. H., 22, Southfields Road, Oxford. *l.*

1906 HAMMOND, L., Letchmere, Alden Lane, Purley. *l.*

1903 HARE, E. J., F.E.S., Dunham, Boscombe, Hants. *l.*

1911 HARRIS, P. F., 8, Gresham Road, Brixton, S.W.

1913 HAYNES, E. B., 17, Denmark Avenue, Wimbledon, S.W. *l.*

1905 HILL, E., Roseneath, 3, Dorville Road, Lee. *l.*

1888 HILLMAN, T. S., F.E.S., 11, Eastgate Street, Lewes, Sussex. *l.*

1911 HOLDING, A., 95, Kyverdale Road, Stoke Newington, N. *l.*

1889 HORNE, A., F.E.S., 60, Gladstone Place, Aberdeen. *l.*

1910 HUMM, P. S., L.D.S., 102, Leigham Court Road, Streatham, S.W. *l.*

1914 JACKSON, W. H., Worple Road, Wimbledon, S.W. *l.*

1886 JÄGER, J., 65, St. Quentin's Avenue, North Kensington, W. *l.*

1904 JOY, E. C., F.E.S., Eversley, Dale Road, Purley, Surrey. *l.*

1886 KANE, W. F. DE V., M.A., F.E.S., M.R.I.A., Dadmans, Sittingbourne, Kent. *l, mi, marine invertebrata.*

1898 KAYE, W. J., F.E.S., Caracas, Ditton Hill, Surbiton, Surrey. *l, S. American l.*

1900 KEMP, S. W., B.A., F.E.S., Indian Museum, Calcutta. *l, c.*

1910 KIDNER, A. R., Swinney Garth, Hatherley Crescent, Sidcup, Kent. *l.*

1914 LEEDS, H. A., Grantham Cottage, Milestone Road, Knebworth, Herts. *l.*

1911 LESLIE, J. H., F.E.S., 84, Huron Road, Tooting Common, S.W. *l.*

1903 LISTER, W. K., F.E.S., Street End, Ash, near Canterbury. *l.*

1912 LLOYD, C. T., Camden House, Feltham Hill Road, Ashford Common, Middlesex.

1896 LUCAS, W. J., B.A., F.E.S., 28, Knight's Park, Kingston-on-Thames. *Brit. o., odonata, n, m, b.*

1910 LYLE, G. T., Bank House, Brockenhurst, Hants. *h, l.*

1892 MAIN, H., B.Sc., F.E.S., Almondale, Buckingham Road, S. Woodford, Essex. *l.*

YEAR OF
ELECTION.

1886 MANGER, W. T., 100, Manor Road, New Cross, S.E. *l, c, cr.*

1889 MANSBRIDGE, W., F.E.S., 4, Norwich Road, Wavertree, Liverpool. *l.*

1912 MARTIN, H. W., Brickholt Cranham, Stroud, Glos. *l.*

1914 MELDOLA, Prof. Raphael, D.Sc., LL.D., F.R.S., F.E.S., F.C.S., 6, Brunswick Square, W.C. *l.*

1885 MERA, A. W., Outwood, High Road, Loughton, Essex. *l.*

1881 MILES, W. H., F.E.S., 7, Church Lane, Calcutta. Post Box 126. *mi, b.*

1880 MONTIERO, A. A. DE C., F.E.S., 70, Rua do Alecrim, Lisbon.

1889 MOORE, H., F.E.S., 12, Lower Road, Rotherhithe, S.E. *l, h, d, e l, e h, e d, mi.*

1910 MORFORD, D. R., 16, Spencer Road, Cottenham Park, Wimbledon, Surrey. *l.*

1911 MORICE, The Rev. F. D., M.A., F.E.S., Brunswick, Mt. Hermon Woking. (*Life Member.*) *h.*

1912 MORRIS, A. C., Leafield, Gibson's Hill, Upper Norwood. (*Life Member.*) *l.*

1912 NEAVE, B. W., Lyndhurst, 95, Queen's Road, Brownswood Park, N. *l.*

1906 NEWMAN, L. W., F.E.S., Salisbury Road, Bexley, Kent. *l.*

1911 PAGE, H. E., F.E.S., Bertrose, Gellatly Road, New Cross S.E. *l.*

1905 PENN-GASKELL, W. W., Townshend House, North Side, Regent's Park, N. W. *l.*

1908 PENNINGTON, F., Reform Club, Pall Mall, S.W. *l.*

1880 PERKINS, V. R., F.E.S., Wotton-under-Edge, Gloucestershire, *l, h, d.*

1911 PESKETT, G. E. H., Llanberis, 37, Woodbury Grove, Finsbury Park, N. *l.*

1887 PORRITT, G. T., F.L.S., F.E.S., Elm Lea, Dalton, Huddersfield. *l, n.*

1912 POULTON, PROF. E. B., D.Sc., M.A., F.R.S., F.L.S., F.E.S., Wykeham House, Oxford. (*Hon. Member.*)

1903 PRATT, W. B., F.E.S., 10, Lion Gate Gardens, Richmond, Surrey. *l.*

1897 PREST, E. E. B., Corrie, Ashtead, Surrey. *l.*

1903 PRISKE, R. A. R., F.E.S., 9, Melbourne Avenue, W. Ealing, W. *l, m.*

Year of
Election.

1911 Quarrington, A., 14, The Broadway, West Norwood, S.E. *l.*

1902 Rayward, A. L., F.E.S., Rockford, Beechwood Road, Sanderstead, Surrey. *l.*
1887 Rice, D. J., 8, Grove Mansions, North Side, Clapham Common, S.W. *orn.*
1902 Riley, N. D., 94, Drakefield Road, Upper Tooting, S.W. *l.*
1910 Robertson, G. S., M.D., St. Anne's, 101, Thurlow Park Road, Dulwich, S.E. *l.*
1887 Robinson, A., B.A., 5, King's Bench Walk, Temple, E.C. *l.*
1894 Robinson, Leigh, F.Z.S., 4, Queen's Walk, Ealing, W. *l.*
1911 Robinson, Lady Maud, F.E.S., Worksop Manor, Notts. *l, n.*
1887 Routledge, G. B., F.E.S., Tarn Lodge, Heads Nook, Carlisle. *l, c.*
1900 Rowden, A. O., 3, Archibald Road, Exeter. *l, b.*
1904 Rowland-Brown, H., F.E.S., Oxhey Grove, Harrow Weald. *l.*
1890 Rowntree, J. H., Scalby Nabo, Scarboro', Yorks. *l.*
1898 Russell, A., F.E.S., Wilverley, Dale Road, Purley. *l.*
1915 Russell, S. G. C. 14, Waldegrave Park, Strawberry Hill, Middlesex. *l.*

1908 StAubyn, J. S., Tregothnan, Endlesham Road, Balham, S.W. *l.*
1888 Sauzé, H. A., 35, Collingtree Road, Sydenham, S.E. *l.*
1914 Schmassmann, W., Beulah Lodge, London Road, Enfield, N. *l.*
1902 Scollick, A. J., F.E.S., Elmswood, Malden Road, New Malden, S.W. *l.*
1910 Scorer, A. G., F.E.S., Hillcrest, Chilworth, Guildford. *l.*
1911 Sennett, N.S., F.E.S., 32, Bolton Gardens, S. Kensington, S.W. *c.*
1910 Sheldon, W. G., F.E.S., Youlgreave, South Croydon. *l.*
1898 Sich, Alf., F.E.S., Corney House, Chiswick, W. *l.*
1903 Smallman, R. S., F.E.S., Eliot Lodge, Albemarle Road, Beckenham, Kent. *l.*
1908 Smith, B. H., B.A., F.E.S., *President*, Edgehill, Warlingham, Surrey. *l.*
1890 Smith, Walter, 227, High St., Hampton Hill, Middlesex. *l.*
1890 Smith, William, 13, St. Mirren Street, Paisley. *l.*
1882 South, R., F.E.S., 4, Mapesbury Court, Shoot-up-Hill, Brondesbury, N.W. *l.*
1908 Sperring, C. W., 8, Eastcombe Avenue, Charlton. *l.*

YEAR OF
ELECTION.

1912 STALLMAN, F. H., Braemar, Thurlow Park Road, Dulwich, S.E. *l.*

1873 STANDEN, R., F.L.S., F.E.S., Newlyn, Romsey, Hants. (*Life member.*) *l.*

1872 STEP, E., F.L.S., *Hon. Editor.* *b, m, cr.: Insects, all Orders.*

1909 STONE, F. J., 141, Bedford Road, Clapham, S.W. *l.*

1910 STONEHAM, Lieut. H. F., F.E.S., Stoneleigh, Reigate. *orn, l.*

1913 STOREY, GILBERT, Dept. of Agriculture, Cairo, Egypt. *Econ. Ent.*

1911 STOWELL, E. A. C., B.A. (Oxon.), Laleham, Bexhill. *l.*

1911 SWEETING, H. R., M.A., Wilfruna, Alexandra Grove, N. Finchley. *l.*

1894 TARBAT, Rev. J. E., M.A., Fareham, Hants. *l, ool.*

1913 TATCHEL, L., 23, The Arcade, Bournemouth. *l.*

1910 TAUTZ, P. H., Cranleigh, Nower Hill, Pinner. *l.*

1911 TODD, R. G., The Limes, Hadley Green, Barnet. *l.*

1902 TONGE, A. E., F.E.S., *Vice-President*, Aincroft, Grammar School Hill, Reigate. *l.*

1895 TUNALEY, HY., F.E.S., Castleton, Searle Road, Farnham. *l, h.*

1887 TURNER, H. J., F.E.S., *Hon. Report Secretary*, 98, Drakefell Road, New Cross, S.E. *l, c, n, he, b.*

1889 VINE, A. C., 45, Temple Street, Brighton, Sussex. *l.*

1889 WAINWRIGHT, C. J., F.E.S., 45, Handsworth Wood Road, Handsworth, Staffs. *l. d.*

1911 WAKELY, L. D., 34, Lancaster Road, Wimbledon Common, S.W. *l.*

1880 WALKER, Comm. J. J., M.A., F.L.S., F.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c.*

1886 WALSINGHAM, The Right Hon. Lord, M.A., LL.D., F.R.S., F.L.S., F.Z.S., F.E.S., &c. (*Hon. member.*) *l, orn.*

1888 WEBB, S., 9, Waterloo Crescent, Dover. *l.*

1911 WELLS, H. O., 42, The Avenue, Norwood, London, S.E.

1872 WEST, W., *Hon. Curator*, 8, Morden Hill, Lewisham Road, S.E. *l, c, he.*

1878 WEST, W., L.D.S., Holmwood, Barnett Wood Lane, Ashtead, Surrey. *l, mi.*

1911 WHEELER, The Rev. G., M.A., F.Z.S., F.E.S., 37, Gloucester Place, W. *l.*

Year of
Election.

1887 Whiffen, W. H., Brockenhurst, Hants. *l.*

1914 Williams, B., 77, Durham Road, E. Finchley, N.W. *l.*

1912 Williams, C. B., B.A., The Horticultural Institute, Merton, Surrey. *l.*

1905 Winkworth, J. T., 290, Burdett Road, E. *l.*

1913 Wixcey, C. R., 63, Grovelands Road, Palmers Green, N. *l.*

1914 Worsley-Wood, H., 31, Agate Road, Hammersmith, W. *l.*

Members will greatly oblige by informing the Hon. Sec. of any errors, additions or alterations in the above Addresses and descriptions.

REPORT OF THE COUNCIL, 1914.

THE Council of the South London Entomological and Natural History Society, in presenting the forty-third Annual Report, is able to state that the Society continues in a satisfactory condition.

During the year just passed 8 new members have been elected.

Only one death has occurred during the past year, that of Mr. J. Alderson, who was killed whilst riding his bicycle, through being run into by a motor-car. He joined the Society in 1907, was an energetic collector of Lepidoptera, and had obtained the Merrifield grant for collecting abroad.

The Membership at present stands as follows: Hon. Members 3, Life Members 8, Ordinary Members 165,—total 176.

The Balance Sheet, duly audited, is printed on pages xvi, xvii.

The Meetings have been well attended, but the war has made a difference during the latter part of the year.

At the Meeting on April 23rd there was a Special Exhibition of Orders other than Lepidoptera; this, the second of this description was a great success.

At the Annual Special Exhibition of Varieties held in November, there was a larger attendance, both of members and friends, and a greater number of exhibits, than in 1913; and although nine-tenths of the latter were devoted to Lepidoptera, the varieties shown were, perhaps, on the whole, of more scientific interest than on previous occasions.

The Society is indebted to Mr. F. Noad Clark for again taking charge of the lantern, and regrets that, owing to business engagements, he has been compelled to resign the office of Lanternist, which he has so competently filled for many years. We wish him every success in his new venture. Mr. A. W. Dennis has kindly filled his place, and the Council feel sure that they could not have chosen a better successor to Mr. Clark.

Mr. D. R. Morford succeeds Mr. A. W. Dennis as Recorder of Attendances.

The following is a list of the Papers read before the Society.

February 12th.—"The Genus Melitæa," by the Rev. G. WHEELER, M.A., F.Z.S., F.E.S.

February 26th.—"Photographing Birds on a South Coast Beach," by C. W. COLTHRUP.

March 26th.—"*Colias edusa* in Britain," by ROBERT ADKIN, F.E.S.

May 14th.—"The Thysanoptera," by C. B. WILLIAMS, B.A., F.E.S., with lantern slides.

May 28th.—"Luminous Insects," by K. G. BLAIR, B.Sc.. F.E.S., with lantern slides.

October 8th.—"The Sea-shore and its Plant-Life," by E. J. SALISBURY, D.Sc., F.L.S., with lantern slides.

October 22nd.—Mr. B. S. Curwen introduced a discussion on the "Anthrocerids," when members brought exhibits of this interesting "family," and contributed to the discussion, which made a very successful meeting.

November 12th.—"Notes on the British Land Mollusca," by E. Step, F.L.S., to accompany a set of lantern slides contributed by W. J. Lucas, B.A., F.E.S.

December 10th.—"The Longhorned Grasshoppers," by W. J. Lucas, B.A., F.E.S., with lantern slides.

January 14th.—"Some Pupal Habitations," by R. Adkin, F.E.S.

The Honorary Curator, Mr. W. West (Greenwich), reports that the principal addition to the Collections has been the fine donation of Micro-lepidoptera by Mr. W. G. Dawson, which has filled up many gaps in the cabinet. Other contributions include a fine series of *Luperina gueneei*, from Mr. B. S. Williams, and a box of Diptera from Mr. H. W. Andrews. Messrs. Ashby, Ashdown, and the Curator have again made valuable additions to the Coleoptera.

The Librarian reports that the new bookcase has been much appreciated by the Members, its acquisition having enabled him to rearrange the books, and to make them more accessible for reference. He hopes to be able to complete the new catalogue of the Library in the ensuing year.

There have been four Field Meetings held during the year, but, owing to the extreme dryness of the "season," there was no "Fungus Foray."

May 23rd.—PICKETT'S HOLE and RANMORE COMMON, conducted by Messrs. E. STEP and HY. J. TURNER.

June 20th.—BEACONSFIELD, conducted by Mr. HY. J. TURNER.

July 18th.—ASCOT, conducted by Mr. B. S. CURWEN.

September 12th.—BYFLEET, conducted by Mr. S. EDWARDS.

Reports of these meetings, furnished by the respective conductors, will be found in the "Proceedings."

Messrs. E. Step and Hy. J. Turner were the Society's delegates to the Annual Congress of the South-Eastern Union of Scientfic Societies, held in June at Bournemouth, and the Society is much indebted to them for the able way in which they have again discharged the onerous duties of their office. The report of this important and interesting Congress will be found in the Proceedings.

The Volume of Proceedings published during the past year consists of xvii. and 158 pages, with nine plates.

The additions to the Library during the year consist of the following:—

Books.

"Type species of Ichneumonidæ."
"Ready Guide to British Birds."
"British Noctuæ," 4 vols., J. W. Tutt, from Mr. W. Dunster.
"Monograph of the Foraminifera of the Pacific Ocean."
"Hepaticæ of Peru," U.S.A. Museum.
"Monograph of the Plant-lice of the New World."
"Genitalia of the Geometridæ," F. N. Pierce, from Mr. R. Adkin.
"Ichneumonidæ," Pt. III., Brit. Mus. Pubn., from the Trustees.

Magazines and Periodicals.

"Entomologist's Monthly Magazine."
"Entomological News."
"Canadian Entomologist."
"Entomologist."

"Irish Naturalist."
"Deutsches Entomologische Mitteilungen."
"Bulletin of the Entomological Society of France."
"Entomologist's Record."

Reports and Transactions of Societies.

"Smithsonian Report, 1915."
"Hastings Scientific Society."
"Haslemere Nat. Hist. Society."
"Herbarium of the U.S.A. Museum."
"Laboratory of General Zoology, Portici, 1913."
"Zoological Society."
"Horniman's Museum."
"Entomological Society of Ontario."
"East Kent Nat. Hist. Society."
"British Association, 1913."
"Holmesdale Nat. Hist. Society."
"U.S.A. Museum."
"Perthshire Natural Science Society."
"Torquay Nat. Hist. Society."
"City of London Ent. Society, 1912-13."
"Cambridge University Library (Mass.)."
"Cornish Pilchard Fishery."
"Hastings and E. Sussex Nat. Hist. Soc."
"Manchester Entomological Society."
"Essex Naturalist."
"Croydon Nat. Hist. and Scientific Society."
"South-Eastern Naturalist."
"Lancashire and Cheshire Ent. Society."
"Louisiana Museum."
"Lloyd Library."
"Canadian Agricultural Department."

Pamphlets and Separata.

"Alternation of Generations in Algæ."
"New England Spiders," 2 pts.

"Marine Foraminifera of the Pacific Ocean."
"Souvenir of the Haslemere Nat. Hist. Society."
"Upsala publications on Economic Entomology."
"Bacilli in *Musca domestica*,"
"Transmission of Plague in Fleas,"
"Effects of Insecticides on Fleas," } from Mr. Bacot.
"Bacteria in Alimentary Canal of Fleas,"
"Study of Bionomics of Common Rat Flea,"
"Additions, etc., to Catalogue of Lepidoptera of Trinidad, by W. J. Kaye, from the Author.
"Pamphlets issued by the U.S.A. Museum."
"Study of the Ophiurans of the N. Museum, U.S.A."
"Field Museum of Nat. Hist., Chicago."
"Observation on the larvæ of Fleas."
"Catalogue of Dobrée Collection of Noctuæ," from Mr. W. Brooks.
"The Water-beetle, H.S. Cheavin," from the Author.
"Department of Agriculture, Bull. 3."

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

STATEMENT OF ACCOUNTS FOR THE YEAR 1915.

REVENUE ACCOUNT.

Expenditure.		£ s. d.
To One Year's rent		25 0 0
,, Insurance		0 14 0
,, Attendance one year		2 10 0
,, Subscription to South-Eastern Union		0 10 0
,, Postages, Stationery and Sundries:—		
S. Edwards	5 3 6	
H. J. Turner	12 6	
T. W. Hall	1 17 0	
		7 13 0
,, F. Wheadon (Printing)		0 9 6
,, Entrance fees carried to Suspense Account ..		0 17 6
,, Vote to Publication Fund		25 0 0
,, Vote to Library Fund		1 0 0
		£63 14 0

Income.	£ s. d.
By Balance from 1913	1 0 3
,, Subscriptions, 86 at 10/–	43 0 0
,, ,, 11 ,, 7/6	4 2 6
,, ,, 1 ,, 6/–	0 6 0
,, ,, 4 ,, 5/-	1 0 0
,, ,, 6 ,, 2/6	0 15 0
,, ,, paid in advance	3 0 0
,, Arrears of Subscriptions received	4 5 0
,, Entrance fees, 7 at 2/6	0 17 6
,, Debit Balance	5 7 9
	£63 14 0

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT.

(Held in Suspense.)

	£ s. d.
To Balance	48 4 6
	£48 4 6

	£ s. d.
By Balance from 1913	47 7 0
,, Entrance fees, 1914	0 17 6
	£48 4 6

LIBRARY FUND.

	£	s.	d.		£	s.	d.
To two years' Subscription to "Ent. Mo. Mag."	0	12	0	By Balance from 1913	0	18	4
,, Binding (Andrews)	0	18	9	,, Fines (1914)	0	3	10
,, Balance	0	11	5	,, Vote from Revenue Account	1	0	0
	£2	2	2		£2	2	2

PUBLICATION FUND.

	£	s.	d.		£	s.	d.
To Debit Balance (1913)	4	11	11	By Donations	19	1	6
,, Archer's Account for 1914 "Transactions"	38	3	4	,, Sale of "Proceedings"	0	19	8
,, Gibbs and Bamforth for Illustrations	6	14	0	,, Vote from Revenue Account	25	0	0
				,, Debit Balance	4	8	1
	£49	9	3		£49	9	3

BALANCE SHEET.

Liabilities.	£	s.	d.	*Assets.*	£	s.	d.
To Debit Balance Revenue Account	5	7	9	By amount to Credit of Suspense Account	48	4	6
,, ,, ,, Publication Fund	4	8	1	,, ,, ,, ,, Library Fund	0	11	5
,, Balance being excess of Assets over Liabilities	45	2	1	,, Amount of subscriptions in arrear, £15 7s. 6d., valued at	6	2	0
	£54	17	11		£54	17	11

Audited and found correct, *January 23rd*, 1915.

A. RUSSELL,
B. S. CURWEN, } *Auditors.*

The Genus Melitæa.

By the Rev. G. Wheeler, M.A., F.Z.S., F.E.S.—*Read February 12th*, 1914.

Human memory is proverbially short, but it may perhaps be within the recollection of those members of the Society who read the "Entomologist," that between June, 1908, and December, 1911, I wrote in that magazine a paper, extending over 25 numbers, on one group of the Genus we are to consider this evening, *viz.*, that group of which *athalia* may be taken as representative.

At the beginning of that paper, after referring to the almost insuperable difficulty of separating the species in that group, and of naming all specimens correctly, I observed :—"For this difficulty two principal causes are responsible: first, the close resemblance *inter se* of the different species, and, secondly, the very great range of variation in each species, though always within certain definite limits. But it is the combination of these two difficulties which makes this group of almost unequalled biological interest amongst European butterflies; for we have here exactly the condition of things which was long ago laid down by Darwin ('Origin of Species,' chap. ii.) as that in which it is easiest to see species as it were in the making. If species have been evolved from previously existing ones, it would be a most remarkable circumstance if we could find no examples of the process taking place under our eyes; yet the majority of collectors (if not even of naturalists) who give an unhesitating assent to some theory of evolution, seem to expect to find it possible in all cases to say with certainty to what species any given insect belongs; disregarding in practice the possibility, nay, the extreme probability, that amongst the number of the European butterflies, many of which are very variable, some few may be expected to exhibit the process of species-making, or, in other words, to afford instances of species not yet absolutely differentiated from each other, and to certain individuals of which it is therefore impossible to assign with certainty the correct name. I believe this to be the case with the genus *Melitæa*, and pre-eminently so with that group of it associated with *athalia*, so that there will remain for generations to come a difficulty, no doubt in time a decreasing one, in finding differentiating characters between the species which will hold good in every instance; nor must we even be surprised if we find individual members of one species (when circumstances, such as rearing from one batch of ova, leave no room for doubt as to their identity) occasionally exhibiting one or more of the very characters which we are accustomed to regard as distinctive of another species, the whole genus being still in a condition of flux sufficient to lead to frequent instances of atavism."

It will be observed that these remarks are applied only to the *athalia*-group, and so far as the European species are concerned this is the only group at all noticeably affected; for though occasional doubts might arise in another group between certain specimens of *didyma* and *trivia*, the specimens in question would rarely, if ever, be European ones. But when we come to look at the genus as a whole, the same difficulties would be experienced, probably in almost as acute a degree, in the *aurinia*-group in North America and the *cinxia* group in Central and Eastern Asia.

I am using the terms *athalia*-group, *aurinia*-group and *cinxia*-group for the three divisions into which the palæarctic species of the genus naturally fall, not because these are all really the most typical species of their respective groups, but because our only three British representatives of the genus each belong quite distinctively to one of the three, and I hope by thus connecting each group with its British representative to make this paper both more interesting and more intelligible to those whose studies are more particularly concerned with our British fauna. There remains, however, another group, confined to the nearctic region, which may be called the *wrighti*-group, which takes the place, on a somewhat different evolutionary line, of the *athalia*-group in America, where the latter, strictly speaking, is unknown.

I suppose that the writer of a paper on any genus of insects would be expected to attempt something in the nature of a history of the genus, though on such an occasion as the present anything more than a mere sketch would be out of place, and it must be at once admitted that anything more would also be impracticable, for the genus occupies so vast a territory, such immense portions of which are entirely, or almost, unexplored, that our knowledge even of the imagines is extremely fragmentary, whilst our ignorance of the early stages of the various species, outside those which inhabit the well-worked portions of Europe and some few oases of knowledge in America, is profound.

How minute indeed are the scraps of our puzzle, and how many of them are still to seek, may be gathered from the misconceptions which surround some of even our well-known European species. I do not wish just now to touch on such questions as the specific value of such forms as *britomartis* and *dictynnoides*, but there are two points to which I must refer, since they have an important bearing on distribution, and indeed on the whole past history of the genus. These two points are the specific distinctness of *merope* from *aurinia*, and of *varia* from *parthenie*. The two former species are, I believe, separated, in time, by almost the whole palæarctic species of the group, since I regard *merope* as the most ancestral of the genus with the probable exception of *iduna*, and *aurinia* as the most modern palæarctic species of the group, excepting only its direct derivative *desfontainii*; although of course *aurinia* was not derived from *merope* through *maturna*, nor even through *cynthia*, but either directly through gradual divergence consequent on isolation, or indirectly through some form now extinct, or at any rate still undiscovered. Of these two hypotheses the former appears to me the more probable, for the isolation of the two species is complete. In the Alps they never approach within some 1,500ft. of each other at the lowest computation, and in the Altai Mountains, where two small mountain forms exist, the var. *asiatica*, which really is a form of *aurinia*, occurs up to 4,000ft., and then after a gap of 2,000ft. *merope* appears, and may be taken from 6,000ft. to 8,000ft., as in the Alps. The so-called *merope* of the Pyrenees is (like *asiatica*) a small mountain form of *aurinia*, and not the Alpine species at all.* The details of the neuration should be referred to in support of this contention, since the remnants of a much more primitive form are to be found in *merope* than I have ever found to occur in *aurinia*, traces of the main stem of the obsolete nervure iii in the forewing being plainly visible in the former, and the distal ends of its primary bifurcation being well marked, especially in the female. With regard to *parthenie* and *varia* their specific distinctions are so many and so definite that the only wonder is that they were ever taken for the same species. The affinities of *varia*, as I have shown in the paper already referred to, are really rather with *aurelia* and, less closely, with *asteria* than with any others of the group. The confusion existing in the writings of some of the German authors, and unfortunately followed by Aurivillius, who calls *aurelia parthenie*, and *parthenie parthenoides*, may in some measure account for the persistent placing of *varia* as a mountain form of *parthenie*, and the inclusion of *varia* under this heading certainly explains much that has been written on *parthenie* which would otherwise be not only unintelligible but even inexcusable. The true position of *varia* is of some considerable importance, since it is somewhat widely spread in the mountains of Asia, especially in the form *alatauica*, Stgr., in company with one or two other closely-related species, whereas *parthenie* is purely European and even, I believe, restricted to the centre and west of Europe.

We will now see what portions of the history of the genus we can piece together from the very fragmentary materials at our command.

Whenever a group of closely related species is practically confined to the palæarctic region, especially if some of its members are found in very high latitudes, and others (or the same) at great altitudes, it is safe to conclude that the home of the ancestral species was northern, and when the group extends into the new world as well, the conclusion that its original home was in the far north, and that it has spread downwards is irresistible. Such a group is that under present consideration, and the Coliads would furnish another similar instance. Of course, the formation of the continents of both hemispheres has undergone great changes since the dispersal of these groups began, but these changes are not so great as to discount the extreme probability that the migration took place from east to west in the case of genera predominant in America, and from west to east in those predominant in Asia and Europe. The genus *Melitæa* comes under the latter head, and it is fairly certain that we must look for its ancestral home in the far north of Asia. The entire absence of butterflies from Iceland, and even the lack of any indigenous butterfly in the Shetlands, certainly both point to the Siberia-Alaska route as the only one available for the stream of migration in whichever direction, so far as the two hemispheres are concerned; but except when impeded by some impassable barrier, a species, or some members of a group of species, would probably spread in every available direction, as was evidently the case with the genus now under consideration. The forms which inhabit the mountains would be the first to spread along the mountain-chains, reaching greater and greater elevations as they progressed southwards, and sending down offshoots to the lower slopes and gradually to the plains below. Many of these modified forms might reasonably be expected to confine themselves to small, or comparatively small districts, and might even be found at great distances apart when similarity of climate, food-plants, and environment generally, had tended to guide evolution on similar lines; others, again, which had originally been suitably placed and had developed into a strong and aggressive stock, might again spread widely, even though they were not constitutionally fitted for life in an extremely cold climate, since it would not be necessary for them, being developed further south, to go again into high northern latitudes or to cross the higher passes of the mountains. We shall expect then in these cases that the more ancestral forms will be found high on the mountain ranges in widely separated localities, that many forms of later development will be restricted in their localities, especially if those localities are among mountain masses, that comparatively recent forms will in some instances be wide-spread, but that their distribution will be continuous, whilst the most modern of all (probably the most southern) will again be very restricted in their habitats.

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* So also the specimens at South Kensington brought by Mrs. Nicholl from the Picos de Europa are tiny *parthenie* and not *varia*.

Now, does the distribution of the species of *Melitæa* tally in any degree with these *a priori* expectations? I think it will be found to do so to a remarkable extent. Three species are common to the high mountains of Europe and Asia, *merope*, *asteria* and *varia*, three of the most ancestral forms of the genus; four only of the lowland or sub-alpine species are to be found from the east to the west of the old world, *athalia*, *dictynna*, *phœbe* and *didyma*, all of which may be regarded as comparatively recent forms; indeed, only with regard to the first two of these can there be a reasonable doubt, for the other two belong to a group which is on the whole much more southern in its distribution, and none of the species of which inhabit very high latitudes, or reach nearly to the highest mountain altitudes inhabited by the other groups of the genus, and one of which, *didyma*, perhaps the most widely spread, is amongst the furthest removed from what is probably the most primitive form of this group, *viz., cinxia*.

A word of warning is necessary before entering more fully into this question of distribution. A glance at Staudinger's Catalogue will probably reveal innumerable discrepancies between these conclusions and the distribution of species as they are placed in the Catalogue, and it is impossible to urge too strongly an utter distrust of the Catalogue with regard to the species to which the different forms are assigned. Probably no one was better acquainted than Staudinger with the distribution of the different forms, and few more totally incompetent to assign them to their proper species. Specimens identified by the discoverers of many of the Asiatic species are in the National Collection at Kensington, and it is a fairly easy task for any lepidopterist to see how impossible it is to accept the arrangement of the Catalogue. Perhaps two of the most glaring instances are to be found under *aurelia* and *asteroidea*. Under the former are named six "varieties," of which only one, *rhætica*, which was not really worth naming at all, belongs to this species. *Dictynnoides* and *britomartis* are distinct species, or, if the latter is not so, as Dr. Chapman supposes (in my opinion on quite insufficient grounds), it is, on the same authority, a form of *dictynna*, which is certainly its nearest relative; *norvegica* is a variety of *varia*, *mongolica* and *amurensis* of *athalia*. With regard to *asteroidea* there can be no doubt that Staudinger knew what he meant by the type form as he himself is responsible for naming it, but he places under the same heading *solona*, Alph., and *jezabella*, Obth., the former of which is certainly a very different species, while the latter is almost as far removed from *asteroidea* as it can be to be a *Melitæa* at all. Staudinger's treatment of *saxatilis*, though less important, is also unintelligible, for while *saxatilis* is almost certainly, and *maracandica*, *fergana* and *lunulata* are probably, forms of *didyma*, *infernalis* cannot possibly be co-specific with *athene*; probably both are separate species, the former including the var. *shandura*, and being nearly related to *didyma*, and the latter nearer to *trivia*, but having, as shown by the female, some affinities with the lovely *romanovi*. Indeed, if I can inculcate a complete distrust both of the arrangement and the nomenclature of the Catalogue, I shall have accomplished a sufficiently useful task to atone for the deficiencies of the rest of this paper.

We will now return to the question of distribution, but it must be again observed that vast tracts of the Asiatic region are still wholly unexplored, and that even in the case of those portions of whose fauna we are least in ignorance, we frequently owe such knowledge as we possess to the passing visits of entomologists who have only been able to give a very short time to any one locality, and that when, or if, these regions are ever explored, the result may be on the one hand to solve some at least of the puzzles with which we are at present confronted, or on the other to upset any conclusions at which, "in the present state of our ignorance," we may arrive.

If the supposition be correct (and it is probably the least uncertain of our conclusions) that we must look in the far north for the earliest home of the genus, it follows almost of necessity that the *aurinia*-group is the oldest of the three represented in the palæarctic region, since the only species distributed throughout that range belongs to this group, *viz.*, *iduna*, which is found from the extreme north of Lapland to the north-east of Siberia; the only district where this species has been found further south is the Altai range, together with the Targabatai range just below, so that it would seem at present probable that the original home of the group was somewhere to the north of this, say roughly between 80° and 100° E. long., and that it spread in early times both east and west, extending largely into North America, almost all the American Melitæids belonging to this group. The affinities of the North American species are however in most cases more directly with *maturna*, so that either the migration must have taken place after the appearance of some near ancestor of this species, or the evolution of the genus must have proceeded on closely parallel lines. The former hypothesis however does not refer directly to *maturna* as we know it in most European localities, but rather to the form known as var. *uralensis*, whose distribution covers the mountain ranges of Asia from the Urals to Amurland, and which with its very pale, sometimes almost white, bands on the upperside is much nearer to *iduna*. The next oldest form is no doubt *wolfensbergeri*, the variety which we know in some of the higher parts of the Alps, but which is also found in the Altai range. This is much duller than typical *maturna*, but has the thin scaling, especially on the underside, which seems particularly associated with high arctic, and to some extent high alpine, forms, whilst typical *maturna* is remarkable for the density of its scaling, especially in its southern localities, such as South Germany, where the colouring of the darker bands of the underside hindwing often looks as if it had been plastered on with a paint brush. Thus, while from the point of view of nomenclature we have to speak of the other two forms as varieties of *maturna*, phylogenetically the latter is a much more recently evolved lowland form of *wolfensbergeri*, which in its turn seems to have arisen in Central Asia as a mountain form of the older and more northern *uralensis*. Those species in which a white colouring is developed would appear to be rather mountain than arctic forms, especially when the colouring is of at all a thick appearance; thus *cynthia*, belonging to this (the *aurinia*) group, is confined to the Alps of Central Europe, and *romanovi*, belonging to the *cinxia*-group, has been found in some of the ranges of northern Mongolia, both east and west, as well as in Central Thibet. Its range is therefore much wider than that of *cynthia*, and it will be necessary to refer to it again. It may be added that *iduna* from the Altai is much whiter than the same species from polar regions. The distribution of the very primitive *merope* and the probable method of descent of *aurinia* from this species have already been spoken of. The extreme variability of *aurinia* and the extent of its southward progress both point to its comparatively modern origin, while there can be practically no doubt that *desfontainii*, the only species of this group which extends into Africa, has been directly derived, through its var. *bætica*, from the Spanish form, var. *iberica*, of *aurinia*, though there is no difficulty in distinguishing the two species. The North American species *taylori*, *acastus*, *anicia*, *editha*, *chalcedon* and *cooperi* (*perdiccas*), as well as other forms probably referable to one or other of these species, extending between them from Vancouver to New York, though mostly inhabiting the Eastern States, all belong to this group, and when this region is more thoroughly explored, it is probable that others will be discovered. A further line of evolution from this group has arisen in the nearctic region, in the form of *phaëthon* and possibly other species closely related to it, but I have no doubt that they have travelled too far from their ancestry to be included in the genus and that their removal from it was entirely correct.* These facts seem to point to the New World as the special scene of the development of the *aurinia*-group, though there is at present one known species, *cynthia*, confined to Europe, and another, *desfontainii*, to Southern Spain and North-West Africa,† and the very restricted range of these species makes it appear likely that there may also be some yet undiscovered among the mountain ranges, or perhaps the lower levels, of the unexplored parts of Asia.

The fact that there are two high mountain species in the *athalia*-group, both of which are common to Europe and Asia, while there are no such species in the *cinxia*-group, makes it probable that the former is of older derivation than the latter, and the excessively unstable condition of the species of this group in Europe, where it seems to have specially developed itself, which might be held to militate against this view, does not really do so, since this condition is more than matched by the Asiatic species which cluster round *didyma*, and for range of variation there is no species—not even excepting *athalia*—which can even approach another member of the *cinxia*-group, namely, *phœbe*. Of the *athalia*-group the most primitive member is certainly *asteria*, and though this species has so far been found only in the Alps and the Altai, yet it is so extremely local that it may easily yet be found in other high ranges, or on the other hand the same causes which so restrict its habitats would be likely also to lead to its extinction. The other high mountain species, which in Europe stands alone, *varia*, is in Asia the centre of a small group, *asteroidea*, *solona*, and more distantly *balbita*, all of which however show distinct cinxiid affinities on the underside, and constitute one of the special puzzles of this genus. I have dealt at such length on a previous occasion with the European species of the *athalia*-group, that I must not now enter at all fully into this branch of the subject, and must content myself with referring to my paper in the "Entomologist," especially the June, August, and October numbers for 1910 for the reasons which still compel me to believe in the specific value of *britomartis* and *dictynnoides*, and to reject the extravagant claims which have been made as to the importance of the genitalia as a final court of appeal as to the identity or otherwise of nearly related species.

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* The genus *Phyciodes*, which extends into Central and even South America, and which is by most writers mixed up with *Melitæa*, even to the inclusion of such obviously Melitæid species as *cyneas* and *fulvia*, may possibly, as hinted by such species as *theona*, be derived from the *aurinia*-group of this genus; to me however it seems far more probable that its origin is directly Brenthid; the whole pattern of the underside, and usually of the upperside also, points in this direction. It is easy to lay too much stress on the importance of wing markings, but easier still to lay too little. The question depends less on superficial resemblance than on essential identity of derivation.

† It has been asserted that this species also occurs in Asia Minor, in which case it must there be a derivative of var. *orientalis*. If it does so occur it would not be a unique instance of the disconnected appearance of a species in these two widely-separated localities. *Zegris eupheme* is another case in point.

This latter question, however, seems to me so important that I cannot refrain from quoting a few paragraphs of the observations I then made on the subject, though they must be read *in extenso* to give more than a superficial idea of the matter. Amongst other remarks I wrote as follows:—"Of course, if the differences were such as to debar insects from pairing, no claim based upon them for the differentiation of species could possibly be regarded as extravagant, for the circumstance would of necessity act automatically in keeping species apart; and I readily admit that there was a time when I was a full believer in this 'lock and key' theory, as it has been called, and was under the impression that only the most closely connected species would ever pair in a wild state, and that the fact of insects of different species ever pairing (except in captivity) was in itself enough to show that they were at least congeneric. It is now of course a matter of common knowledge that scarcely any pairing, even in a wild state, is out of the question, unless some obvious reason should render it physically impossible; and it would be a mere matter of searching in periodicals and the 'Zoological Record' if one wished to produce a long list of what would otherwise be astounding cases. Here are a few picked up at random in the course of searching for information on a widely different subject:—*Tæniocampa stabilis* male and *T. gothica* female ('Ent.,' xxi., p. 158); *Cerastis vaccinii* male and *Miselia oxyacanthæ* female (*loc. cit.*, p. 188); *Xylophasia monoglypha* male and *Hadena trifolii* female (*loc. cit.*, p. 282); *Melitæa athalia* male and *Polygonia c-album* female (Schneider, 'Iris,' xix., p. 107); *Aglais urticæ* male and *Epinephele janira* female ('Ent.,' xxxiii., p. 224); *Melitæa cynthia* male and *Erebia lappona* female (Rebel, 'Societas Entomologica,' ii., p. 73); *Attacus cecropia* male and *Sphinx ligustri* female ('Ent.,' xix., p. 136); *Dryas paphia* male and *Parnassius apollo* female (this I saw myself at Faido, in the Leventina, in company with Mr. Warren); *Salamis anacardii* male and *Aphelia apollinaris* female (Trimen, 'Proc. Ent. Soc. Lond.,' 1880, pp. 23, 24, the moth being a day-flier, and bearing a general resemblance to the butterfly); *Euchloë cardamines* male and *Bapta temerata* female ('Ent.,' xxi., p. 188—here there is no such excuse)."

After admitting the probable infertility of any such pairings (except the two Tæniocampids) I added:—"The very important fact still remains that it is not the differences of the structures in question which *per se* are the cause of the infertility, as they could only produce this effect directly by making pairing itself impossible, and at the most they can only be a secondary and correlated cause, not to be compared in importance with such facts as species appearing at different times, inhabiting different altitudes or latitudes, feeding on different (or at any rate unrelated) food plants, hibernating at a different stage of existence, flying at a different time of day, or possessing any other habit which must either effectually keep them apart, or be practically certain to cause the early death of any hybrid progeny which might manage to struggle into existence."

And again a little further on:—"I do not believe their phylogenetic and consequent classificatory importance to be nearly so great as that of many points in the earlier, especially the egg and newly-hatched larval, stages; as these seem, to some extent at any rate, to recapitulate the evolutionary history of species, genera, etc., or at least to point the way to a partial reconstruction of such history.

"But putting all this aside, and granting for the sake of argument that this is the most important—nay, *far* the most important—of all structural differences, it is still liable to abuse: for it cannot for a moment be conceded (or even claimed) that this is the *only* mode of divergence, and parallel differences in this respect may have been evolved after other divergences had taken place, the dormant tendency having been retained, and we might thus find parallel groups exhibiting the same different forms of clasp, etc., even when these groups had in other respects diverged somewhat widely from each other; and, on the other hand, likenesses, or even identity of structure, in this respect might be retained, especially in closely related species, even after they were specifically separated by differences of habit, food-plant, habitat, etc. In the first case we should find two or more groups of insects, different members of which appeared, judging by the genitalia alone, to be more closely related to members of the other groups than to those of their own; and in the second case we should find insects, obviously from other reasons specifically distinct, 'lumped' together as a single species, on the ground that they were not yet differentiated in this one particular. We have in fact no reason to suppose either that differentiation necessarily takes place simultaneously along various lines, or that it follows a certain routine order in the various lines along which it takes place: on the contrary, all such evidence as we at present possess would seem to point in an opposite direction. A further consideration tending towards the same conclusion is the fact that it is possible in this matter, as in others, that a similarity or even an identity of structure may sometimes be reached along different evolutionary lines.

"It seems also necessary to remark that this means of distinction, in common with all others, is of far greater value in some groups than in others. In a group, for instance, where there is close resemblance between the members with regard to the appendages, a slighter difference will be of importance than in a group where the divergences are generally considerable, and in the same way these characters are of much greater value for specific distinction where little or no variation occurs in the undoubted specimens of a single species, than in a case where their characteristics are by no means so constant."

To return from this digression, which after all only concerns the two species, *britomartis* and *dictynnoides*, so far as I am at present aware.

There are two species of this group at any rate that are peculiar to Asia, *plotina* and *protomedia*. The former seems to be the far eastern representative of *aurelia*, the latter of *britomartis;* both show some affinity, as do the corresponding European species, with *dictynna*, one of the two lowland and sub-alpine species of this group whose range extends from the Atlantic to the Pacific. There is however a marked difference between the two. *Dictynna*, though it varies in detail, is on the whole a remarkably constant species, while *athalia*, though preserving a general likeness, is the most unstable of the whole group. The latter is no doubt the more recent, and whilst the species connected with *dictynna* seem to be more ancestral, there are, both in Europe and Asia species connected with *athalia* which are almost certainly more recent than itself, and which have distinct affinities with the *cinxia*-group. These are in Europe *deione* with its variety—really the older form, as witnessed by its early stages, its neuration, and its geographical distribution—*berisalensis*, and in Asia *sultanensis* in Sarafshan, *arcesia* in the Altai, Eastern Siberia and Amurland, with its variety *chuana* in Central Thibet, and *bellona* in Northern China; possibly also *minerva* in the Ala Tau and Fergana, but with this latter species I have no acquaintance. Here also a reference is needed to the species with similar cinxiid tendencies which have already been mentioned in connection with *varia* in Asia.

And this brings us to the great puzzle of the origin of the *cinxia*-group. The absence of high mountain or really arctic species of this group, and the fact that it reaches further south both in Asia and Africa than any other group of the genus point distinctly to its more modern origin, a theory supported by the instability of the two dominant species *phœbe* and *didyma*; but down in Colorado, almost at the southern limit of the genus in North America, we find the tiny species *perse* which apparently differs from *cinxia* in nothing but its very minute size, and whose claims to specific rank at all would seem difficult to maintain. Now, how did it get there? Its existence seems almost to prove either that the actual *cinxia*-form had been evolved at a common centre, and that the species was once very widely distributed in the extreme north, where it is no longer found, or that a precisely similar form has been evolved in the two hemispheres on a different line of descent. The former hypothesis points to an antiquity for the species against which everything militates, and the latter presupposes a persistence in this species and a liability to extinction in all its neighbours which seems quite incredible. This latter difficulty, however, occurs in a different form even under the former hypothesis, for there is nothing whatever further north in America, so far as is known at present, to make any connection between the *cinxia* of the eastern and the *perse* of the western hemisphere. One help towards bridging over this difficulty is afforded by our experience of this insect in Britain, for we know that *cinxia* is liable to become extinct in the most unaccountable way. I do not believe that the attacks of collectors, except when deliberate destruction by professionals has been practised (a very rare, though not an unknown occurrence), or in the neighbourhood of large towns, has ever had any appreciable effect on the extinction of a species, and in the case of *cinxia* we know that it disappeared from some of its recorded localities while the number of British collectors must have been well under a hundred all told, and the handiest way of getting from one place to another was the stage coach. Its food-plant, again, plantain, is only too common and wide-spread, its favourite haunts, such as landslips, deserted quarries, and rough steep hill-sides are such as are never disturbed by the agriculturist, it has few parasitic enemies (indeed, in the whole of my experience I have never bred a single parasite from any Melitæid in any stage),* yet *cinxia* is probably quite extinct on the mainland of

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* Mr. L. W. Newman and Mr. H. Rowland-Brown have given it as their experience that *M. aurinia* is extremely liable to parasitism. I have only bred this species in the *provincialis* form, and bred no parasites, but the opposite experience here quoted shows that too much stress must not be laid on this argument. It is, however, difficult to believe that the attacks of parasites have operated largely, still less extensively, as the cause of extinction.

Britain, and has become so within the memory of man. There must, of course, be a cause, but whatever it may be, it is probably as liable to affect the insect in other countries as in our own.

Notwithstanding the general resemblance between the members of what I have termed the *cinxia*-group, I am far from certain that they have not been evolved by two quite separate lines of descent, the one in connection with the auriniid, the other with the athaliid group. The close apparent connection on the upperside between *cynthia* and *romanovi*, though the former is pronouncedly auriniid and the latter at least as pronouncedly cinxiid on the underside, is a startling, but perhaps quite deceptive, indication in this direction. If, however, this is the case, the whole *didyma*-group must certainly belong to the romanovid, while the *phœbe*-group more probably belongs to the cinxiid line of descent. The connection between *athene* (so absurdly placed by Staudinger as a form of *saxatilis*) and *romanovi* has been already mentioned, and the *altaica*, *polaris*, and yet more strongly the *chitralensis* forms of *didyma* exhibit a decided tendency towards the white and red coloration of the same species. Too much stress, however, must not be laid on this, since the same tendency exists in *phœbe*, which has the most athaliid underside of the group. That the *cinxia* division is descended from the *athalia*-group through a not remote ancestor of *varia* seems to me, in the face of the Asiatic species so closely connected with the latter, to be almost beyond dispute, and if strong corroboration is needed it is to be found in the fact that practically throughout the range of the *athalia*-group the most recent species, *deione*, *sultanensis*, *bellona* and their varieties, exhibit strong cinxiid tendencies on the underside; unless it be held in the latter case that *bellona* is a cinxiid species having an atavistic tendency towards the *athalia*-group, which (considering the apparent affinities of the one Melitæid species, *jezabella*, which has been found south, and only south, of the palæarctic zone, in south-west China, not only with the athaliid and cinxiid groups, but also with the ancestral auriniids), is at least an arguable position. If we are to divide the cinxiid and romanovid lines of descent, *cinxia*, *perse*, *arduinna*, *gabbii*, *phœbe*, and *ætherea* (if it is a separate species, which I regard as very doubtful) are on the former line, *romanovi*, *athene*, *didyma*, *acraina*, *infernalis*, *sibina*, the *saxatilis* group (if they are specifically distinct from *didyma* and from each other), *yuenty*, *trivia*, *collina* and *agar* are on the latter.

The North American species somewhat complicate the matter; *perse* appears to be so indubitably cinxiid, whilst *minuta* seems* not to be far removed from *didyma*; *gabbii* also, which is certainly on the cinxiid line, shows a distinct connection with the *athalia*-group, while *palla*, another species showing an approach to that group, is an auriniid. The most distinctly athaliid of the American species on the underside is *nubigena*, which is barely distinguishable from *aurinia* on the upperside, whilst *hoffmanni* and *whitneyi* are also distinctly of an athaliid tendency on the underside, and also to some extent, especially the latter, on the upperside also. *Acastus*, a distinct auriniid, has some tendency on the underside to the cinxiid group. There is, however, no actual member of the *athalia*-group in America, and the existence of these species may imply the persistence, in a latent condition, of those forces which in Europe and Asia produced this latter group.

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* This is, however, the only nearctic species which even *seems* to belong to the romanovid section; and if the two lines of descent are really different, the latter may probably be confined to the Old World, and *minuta* really be cinxiid.

With regard to the origin of the *cinxia*-group I can only state the facts as far as I know them, and suggest possible lines on one or other of which the solution of the riddle may eventually be found. It may, however, be taken as almost certain that Asia is the home of this group, and that it has spread westwards in the case of the romanovid section at any rate, though eastwards as well as westwards in the case of the cinxiid section, whatever their origin might have been. Two of the species, *phœbe* and *didyma*, are exceedingly wide in their distribution, extending from the Atlantic to the Pacific and descending into the African, and in the case of *didyma* the Asiatic, deserts, though not reaching very high in the mountains or ascending very far north ; *didyma*, however, is more adventurous in the latter direction than *phœbe*, and probably has the widest range of all the Melitæas. The range of *cinxia* (even excluding *perse*) is very considerable, but does not extend so far in any direction, except perhaps west, as *didyma*, nor so far south or east as *phœbe*.

There remain the few species which in North America seem to take the place of the *athalia*-group, which I have called the *wrighti*-group, which includes *fulvia*, *cyneas*, and possibly one or two others whose specific value is not determined. The peculiarity of this group is the partial or complete loss of the bands of the underside hindwing. I am strongly tempted to enlarge here on my favourite theory of the possible inherent directions of variation in any group or species, for this tendency exists strongly as an aberrational form in the European species of the *athalia*-group, somewhat rarely in *athalia* itself, rather frequently in southern *parthenie*, not unusually in *asteria*, and to some extent in *dictynnoides*, but the subject is too large to touch upon here, beyond observing that this group reinforces what was said some lines back on the persistence of latent tendencies.

I must on the other hand, for the sake of completeness, glance still further back into the history of past ages to see what we can guess of the affinities of *Melitæa* with other groups. It is generally supposed that when the Vanessids and Argynnids separated off on either side of the Nymphalid stirps, the Pyrameids were the first of the former to break off, in other words that the Pyrameids are the oldest genus of the Vanessid line. If this is true, it would seem likely that the Melitæids are older than the Brenthids and Argynnids (in the restricted sense), since their larvæ agree with those of the Pyrameids in possessing a row of central spines, whilst the Brenthids and Argynnids agree with the other Vanessids in being without it. Possibly this may not be a matter of so great importance as others, and I am not suggesting it as probable that the Melitæids are older than the Brenthids and Argynnids, since the closed cell of the hindwing in the latter is a more ancestral character, still I am not at all certain that a comparatively recently lost nervule might not re-appear, especially since a part of this nervule is present in many of the Melitæas, and I have come across a specimen of *varia* with the cell completely closed. On the other hand it is possible that the Pyrameids may not be the oldest branch of the Vanessid stirps. In any case the Brenthids are closer to the Melitæids than are the Argynnids, and it is at least possible that they, or something like them, may be the source of both, since there are some grounds, such as geographical distribution, for doubting the theory that the Argynnids are older than the Brenthids. It is a remarkable circumstance that the species of the Melitæids that most closely approach their nearest neighbours, the Brenthids, on the upperside, all belong to the most recent group, *viz.*, *arduinna*, *trivia*, and *bellona:* this group is on the other hand the furthest removed from the Brenthids on the underside, and this Brenthid upperside cannot be regarded as indicating a closer relationship than exists between the latter and the other groups, but must have developed quite independently. If we take either the upper or underside of the three British species we shall at once be struck by the difference between them, yet an examination will show that the wing pattern is essentially the same in all. Different again as the upperside is from the under in each species, the same pattern is essentially reproduced on the two sides, though there is generally considerable obsolescence on the underside of the forewing, and the suffusion at the base of the hindwing on the upperside usually effaces some part of the wing pattern, which is further concealed by the fact that the diversified colouring of the underside hindwing is never entirely reproduced on the upperside and frequently not even indicated. The pattern of the forewing is therefore best studied on the upper-, that of the hindwing on the underside. That of the forewing consists essentially of the following parts:—Black *border*. Two black lines of varying width and conspicuousness, nearly parallel to the border; these we will call the "*outer and inner subterminal lines*." Between the border and the outer subterminal line, the ground colour shows more or less in the form of lunules, the third of which, counting upwards from the anal angle, often projects further towards the disc of the wing than the others; the direction and curve of the inner subterminal line is a somewhat valuable character in determining the different species. Further towards the base is a sharply elbowed almost sickle-shaped black line of very variable breadth, curving sharply out from the costa towards the outer margin, then inwards towards the base, and again somewhat outwards, spreading out and often dividing towards the inner margin; this we will refer to as the "*elbowed line*," and to the spread-out portion as the "*marginal blotch*." Beyond the elbowed line, nearer to the base, and starting from the first nervure below the costa, is a black spot, normally only outlined and filled in with the ground colour; this we will call the "*stigma*": this frequently joins the elbowed line at its last bend, in such a way as to make it appear to form one line with the lower part of the elbowed line. Still nearer to the base are two narrow black lines, the "*basal lines*," slightly inclining outwards from the costa, in a generally parallel direction to each other, but nowhere actually parallel, as both are irregularly curved and the curves are not parallel. Finally, there is a dark "*basal suffusion*" of varying extent.

A momentary examination of the three species would show at once that this holds good for all, and it is essentially true of all other species of the genus. The differences occur in the intervening portions of the wings. In *cinxia* and, to a slightly less extent, in *athalia* the rest of the wing is unicolorous, while in most forms of *aurinia* it consists of alternate bands of a darker and lighter, generally also of a redder and yellower colour. There are, however, species in all the groups in which this type of colouring persists in certain varieties or aberrations. In the *athalia*-group it is most conspicuous in *dictynna*, though occasionally very marked in *athalia*, especially in certain German females. Among the *cinxia*-group, this alternation of colouring reaches its highest point of development in some forms of *phoebe* among the European species, though it is far more startling in *romanovi* and some other Asiatic species. The other change which occurs is caused by the obsolescence of the black bands, especially in desert species. They are often reduced to spots in *didyma* for example, especially from dry localities, and reach their maximum of obsolescence in *acraina*, from the desert of Fergana, in which only the elbowed line is represented by three or four spots.

The underside hindwing, speaking generally, consists of five bands, three lighter and two darker, all narrowly edged with black, but each of these bands has its own characteristics, which often help in determining the different species. The terminal light band consists of two parts, a narrow edging, bordered on each side, as in the forewing, by a still narrower black line, and a row of light lunules, the edging being usually darker than the lunules. This band turns the corner, as it were, of the anal angle, and appears as a triangular light spot, the inner line of the border being sometimes absent. The outer dark band is also in many species divided into two parts, consisting of a row of lunules and of the small irregular spaces between these and the black outer edging of the central light band. This latter again consists essentially of two portions divided irregularly by a narrow dark line and broken up into spots by the nervures, the inner division being generally of a somewhat darker shade than the outer. The third and fourth spots of the outer portion, counting from the costa, stand out further from the base than the rest. The inner dark band is much widened out in the centre, where it contains a spot of the colour (or of one of the shades) of the lighter bands. This we will refer to as the "*light spot.*" The basal light band consists of five spots, of which the lowest, that on the inner margin, is frequently absent, the central one being the smallest (usually much the smallest), the diminution in size corresponding with the swelling in the centre of the inner dark band, the light spot in which has a tendency in all the species to break occasionally into the small central spot of the basal band. The actual base of the wing is again behind this band, and is cut up by the nervures into four spots, of which, as a rule, only the third (which is roughly triangular, the base resting on the fourth spot of the basal band) is at all conspicuous; sometimes, however, when the central spot of the basal band is unusually small, the second spot is easily distinguishable; the fourth, though much the largest and frequently invading the whole area of the fifth spot of the basal band, is inconspicuous, as it has the appearance, especially when this fifth spot is absent, of being a continuation along the inner margin of the inner dark band. The light bands will be referred to as the "*terminal,*" "*central,*" and "*basal,*" the dark bands as the "*outer*" and "*inner.*" In *iduna* the *outer* and *central* bands are quite undivided, which is therefore probably the original form, especially as the *central* is often undivided also in *asteria*; a regular division of the *outer* band is also confined to the *athalia*-group, but it is interesting to trace the elements of the full pattern in those species in which it only appears in part. To take the three British species: the whole pattern occurs in *athalia*; in *aurinia* the *terminal*, *inner*, and *basal* bands are also as clearly defined, but there are only slight indications at the costa of the division of the *central* band, whilst the lunular formation of the outer portion of the *outer* band is only indicated by the roundness of the paler spots, which in this case contain black dots. These dots are of no phylogenetic value, since not only are they present and absent in nearly related species, but several species sometimes possess and sometimes lack them. In *cynthia* for example they may be present or absent, in *cinxia*, which normally has them, they are occasionally absent, and in *phœbe*, which is normally without them, they frequently appear. In *cinxia* it is not easy to realise the lunular shape of the inner portion of the *terminal* border owing to the fact that the nervures are not black and that the division of the *terminal* band is only indicated by dots, as is also the case with the *outer* band, but the *central* band is divided, also by dots, throughout its length, and the *inner*, and often the *basal*, band is fully developed. It would be an interesting study to follow this up through the foreign species as well, but time will not permit, and I can only hope in this, as in other matters I have touched upon, to throw out suggestions for interesting and profitable study on the part of those who have more leisure and more ingenuity than myself.

Photographing Birds on a South Coast Beach.

By C. W. Colthrup. *Read February 26th*, 1914.

Last June we spent a couple of days on Romney Marsh photographing some of the shore birds that make the South Coast shingle beaches their home during the nesting season.

On the way from the railway station we passed within twelve yards of, and without disturbing, a lapwing sitting on eggs. Had we been walking this bird would have left its eggs when we were still some distance off. In like manner a stone curlew, or Norfolk plover as it is also called—one of the most wary of birds—will allow a man on horseback to ride quite close to it, without showing any concern.

Hares, voles, partridges, coots, moorhens, yellow wagtails and many other species of birds, were seen as we passed the dykes that intersect the marsh; the piping note of the redshank warning all and sundry of our approach.

Leaving the marsh proper behind we missed the bleating of the sheep which are reared there in enormous numbers every year, but our attention was immediately arrested by the extensive masses of foxgloves, etc., that grow in luxuriance out of the bare shingle. Arriving at our destination, a fisherman's cottage, we made the necessary arrangements for conveyance back, as we were quite isolated from the outside world. No post or telegraph office within four miles and no other habitation save the coastguards'. After a good meal and a rough survey of our surroundings we retired for the night. Rising at five o'clock the next morning we stepped direct from our bed-room out on the beach, and our eyes were at once charmed by a large mass of the pink flowers of the sea-thrift growing outside. After an early breakfast we set off with our assistant, shouldering the camera, tent, and other necessary tackle.

Glorious places are these southern beaches on a fine day, where one can wander for miles without fear of molestation. Skylarks are singing everywhere, meadow pipits uttering their characteristic drawn out notes—sip-sip-sip as they parachute to the ground. A wheatear calling chack-chak flies ahead, settles on a stone, flirts its tail, as though urging us on, and repeats the performance till we are well out of range of its nest, and then leaves us.

We next hear the low whistle of a ringed plover, the male giving warning to its mate, who rises behind a bank of shingle, and flies around us, executing the most extraordinary evolutions in the air, all the while repeating softly, yet forcibly, three notes which sound very like "what-a-pity, what-a-pity, what-a-pity." By this performance we know that she has young in the vicinity, but as we have a full day mapped out we pass on. A little farther on a redshank rises with a scream from the centre of a small straggling sloe bush, barely eighteen inches square. There, in a hollow in the centre, lie four beautifully marked eggs on the bare shingle. They must be very highly incubated, otherwise she would have left them long before we got within range. On this occasion, as time was limited, we made arrangements for the various nests which we were to photograph, to be marked beforehand. All the four species of birds I am dealing with to-night, *viz.*, the stone curlew or Norfolk plover, the ringed plover, common and lesser terns, lay their eggs more or less on the bare shingle. The common tern and ringed plover sometimes make nests, those of the former being composed of small sticks and other débris, and of the latter, of small pebbles, mudflakes, etc.; and had I more time I could show you an interesting series of slides showing the variation in the nesting habits of the latter bird. The first bird to be operated on was a Norfolk plover, whose eggs were situated not far from a mass of broom and foxgloves, among which the birds were no doubt hiding, and not far from a colony of the common tern.

The eggs, two in number, were laid in a small hollow on a bare patch of soil, surrounded by sea campion and a few flowers of the sea thrift.

In getting the camera into position, and in order to get a good side view photograph, due allowance must be made for the fact that the bird nearly always faces the wind. More important still, if the wind is blowing from the photographer to the nest, the bird will scent him and will not return to the eggs.

The camera and tent duly erected, I took up my position inside, my assistant adding the final touches to make everything secure, and then retiring to a distance.

Now began a long and anxious watch. In the meantime the common terns filled the air with their rather monotonous cries, "kep-kep," hence their local name "keps."

Time went by, and except for an occasional cry of the male Norfolk plover in the distance, nothing was seen of either bird. I had been watching through a peephole in the tent for three-quarters of an hour, when a slight sound was heard on the beach, and I espied the female approaching stealthily, with head lowered. As she came nearer something happened which almost plunged me into despair. A rush of wings overhead, as some bird swooped at her time after time. She hesitated and ducked her head at each onslaught, but to my relief made a sudden rush to her eggs.

At the last swoop the familiar cry "kep" of the common tern revealed the identity of the aggressor. We were evidently not far from the latter's eggs, which she imagined the Norfolk plover was about to raid. Both the common and lesser terns will swoop at human beings when near their eggs, but I have never known them actually strike, although they come uncomfortably near.

On reaching her eggs, the Norfolk plover examined them, gave a look at the tent, and settled down. I immediately pressed the bulb and secured my first photograph of this species. The sound of the shutter, however, startled her, and she ran off to cover, with her head and body as low down as possible.

The ensuing wait gave one time to think over and enjoy to the full, the satisfaction of having seen the rare and wary bird at such close quarters as six and a half feet, whereas in the ordinary way it leaves its eggs when one is half a mile or so off.

At the end of half an hour the female returned cautiously, and was again the subject of attention of the tern, but beyond ducking her head as before she paid no heed to it. I now made an exposure as she was examining the eggs. She was again startled into running away, but the intervals between her return were now shorter, and I had soon made my fifth exposure. This time she made no movement, even when I reversed the slide. Then happened the most astonishing thing of the morning. I had one plate left, and thought I would like to secure a photograph of her approaching the nest. In order, as I thought, to scare her off, I coughed, but to my surprise she took no notice. I whistled, still no response. I then shouted, yelled and made all kinds of unearthly noises; still no movement, and one would have thought her deaf as the proverbial doorpost. I then put my hand out of the tent and waved it about; all to no purpose. Time was going, and as I had to change plates in order to operate on the common tern, I pressed the bulb and secured a photograph of her as she sat dozing. I now emerged from the back of the tent, and the bird's astonishment and subsequent retreat can be better imagined than described.

Plate changing having been accomplished, I soon set to work on a nest of the common tern, containing two young (one just hatched, the other a day old), and an egg on the point of hatching, the beak of the youngster showing through a hole in the shell.

I had not long to wait for the return of the female, who seemed very anxious for the welfare of the unhatched bird, and also for the safety of the day old youngster which persisted in trying to run from the nest to the shelter of some grass close by. Once under the parent, however, it was kept there by the rather formidable looking beak, to the accompaniment of some rather forcible bird language. She constantly shifted her position, and eyed the lens with interest, then turned her back on it, every now and then regarding it with suspicion. The next bird operated on was a ringed plover, the commonest, yet one of the most dainty and entertaining of shore birds. While we were fixing up the tent some six and a half feet from the four hard-set eggs lying on the shingle, I was deceived into believing that I had an easy task on hand, as both the old birds tripped daintily over the pebbles to within ten feet of where we stood, the male every now and then sinking into a slight hollow, pretending to be sitting on eggs, while the female lay on one side flapping one wing and holding a leg up as though wounded, in true plover fashion. Had one followed them, they would have jumped up, ran a little farther and repeated the performance again and again, till they had drawn one away from their eggs.

My assistant having made everything secure, I commenced what turned out to be a long wait. Both birds pattered about, ten feet away, the male trying to drive the female to the eggs, but she did not summon up courage to do so till I had lain in a cramped position for over an hour. She seemed very nervous and inclined not to stay, so I pressed the bulb, when she jumped into the air as though shot, and flew off. Though I waited another hour and three-quarters, she did not return to the vicinity of the nest, so I turned my attention to a colony of lesser terns. As we approached the birds rose from their eggs, and greeted us with their alarm notes, "skerret-skerret," by which name they are also locally known. We soon found a nest, and erecting the tent I commenced what proved another long and rather trying wait. The air inside the tent became very oppressive, and the shingle a very uncomfortable resting place. Altering my position was a very delicate operation in view of the risk of shifting the shingle and the legs of the tripod.

While waiting thus a wheatear, which has a habit of investigating holes for a suitable nesting place, came inside the tent, and nearly committed suicide against one of the tripod legs, in its haste to make its escape. Sundry bluebottles next put in an appearance, and would persist in flying in my face when I was trying to watch for the returning bird. Spiders and other creeping things also endeavoured to claim a closer acquaintance, and all the while the whole colony of lesser terns were hovering overhead, uttering their ear-piercing cries.

After a while there was a lull, and only the owners of the eggs continued to call. The male then settled close behind the tent and the female some distance in front. Time after time she walked towards the eggs, only to rise and hover overhead again. When I had been waiting just over an hour she pitched quite close to the eggs in a great rage, her head feathers raised and her body feathers puffed out. Fearing that she might not stay after all, I pressed the bulb, and secured a photograph of her in this angry mood, which does not, however, make a good picture. The noise of the shutter frightened her, and she rose immediately. After another half hour's wait, she settled almost thirty feet off, and walked toward the eggs, only to rise and pitch again at the same distance. This was repeated again and again, till I began to despair of her returning to the eggs at all. I was by now feeling very cramped and shifted my gaze from the peephole for a rest. Hearing a slight sound on the beach, you may judge of my relief on again applying my eye to the peephole, to find the bird settled on the eggs. Although the shutter frightened her off she soon returned and stood eyeing the camera suspiciously. The shutter this time did not disturb her, and I was able to reverse the slide and get a final picture of her comfortably settled. My next exposures were on another ringed plover, and were in the nature of an experiment. The camera was erected and left quite uncovered fifteen feet from the eggs, while I was another twenty feet away, hidden in some faggots; the exposure being made with a length of tubing.

The drawback to this arrangement was, that at each exposure it was necessary to leave the hide to change the plate, and call up my assistant, when the birds could see him leave. I had not long to wait before the female approached to within easy distance of the eggs, by a succession of zig-zag runs, and then stood answering the male, who was keeping watch from a small mound that commanded a good view of the surrounding country. As soon as the coast was clear the male gave a low whistle, and the female at once moved in the direction of the eggs. I subsequently obtained a photograph of the bird on the eggs keeping a watchful eye on the camera, and another in which she appeared to be deep in thought.

This was the last photograph I took on the trip; but I hope this year to renew the acquaintance of some of my old bird friends, and to. discover some new ones; and profiting by past experience and some changes in my outfit, to be able to show you later on some better photographs than those I have placed before you to-night.

Colias edusa in Britain.

By Robert Adkin, F.E.S. *Read March 26th*, 1914.

The butterfly that we know as *Colias edusa* received its specific name at the hands of Fabricius in 1787.[1] More than a century and a half before this the species was known in Britain; the first definite record being, so far as I am aware, that by Moufet (1634), who gives fairly good black and white figures of both upper- and undersides, together with an intelligible, although somewhat fantastic, description in Latin.[2] Ray (1710), who in his short diagnosis refers to it as "*Papilio croceus, apicibus nigricantibus* = the saffron-coloured butterfly with black tips," tells us that he found it in Essex, not far from the town of Bocking, and that a Mr. Vernon also captured it in a field at Cambridge.[3] Petiver (1717) gives coloured figures of both male and female; of the former he says "*Papilio croceus, limbo nigricante* = the saffron-coloured butterfly with black borders"; and he tells us that it was seen about Deptford, Peckham, etc., from June to September. Of the female he says *Papilio crocea, limbo nigricante, maculato*, or to put it briefly the spotted saffron butterfly, and tells us that it was "found with the last, and differs from it in having a spotted edge."[4]

It will be noticed that though Moufet did not apply a name to his insect, simply relying upon his figures for identification, both Ray and Petiver speak of theirs as *Papilio croceus*, and although these words may have been used by them in a descriptive sense, they were nevertheless sufficient for identification purposes. In 1758 Linnæus published the tenth edition of his "Systema Naturæ," and in it he described a butterfly under the name of *hyale*.[5] Although the word used to describe its colour is *flavis*, the same as that used in reference to his *Papilio rhamni*, he unfortunately referred to Roesel's figures 4 and 5 of plate xlvi.,[6] which are undoubted *edusa*, as identical with his species, possibly in the belief that his insect and Roesel's were but forms of one species. This led to endless confusion among the British authors of the latter part of the eighteenth century. Thus Moses Harris (1766) gives very good figures of both male and female *C. edusa*, which he calls "Clouded Yellow," but in his 1794 edition refers to it as *hyale* of Linnæus,[7] and in his "English Lepidoptera or the Aurelian's Pocket Companion" (1775), he also mentions a "Pale Clouded Yellow," but fails to find a Linnean name for it. Lewin (1795) makes "confusion worse confounded" by figuring *edusa*, calling it the "Clouded Orange or *Electra*, Linnæus," and on the next plate figuring *hyale*, male, as the "Clouded Yellow" and correctly applying Linnæus' name *hyale*, but also figuring the female as the "Pale Clouded Yellow," without any Latin name.[8]

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[1] F. Mant. T. ii., p. 23.

[2] Moufet. "Insectorum sive Minimorum Animalium Theatrum," p. 100.

[3] Ray. "Historia Insectorum," p. 112.

[4] Petiver. "Papilionum Britanniæ Icones," pl. ii., figs. 3 and 4.

[5] "L. S. N.," ed. x., p. 469.

[6] Roesel. "Insecten-Belustigung," Tl. III., pl. xlvi., figs. 4 and 5.

In 1792 Donovan commenced the publication of his work on British Insects, and in the second volume gave a figure of the male *edusa* and applied the name *hyale*.[9] But as time went on he appears to have detected the error into which he, in common with the authors of his day, had fallen, as in 1798 he figured both *edusa* and *hyale* under their names as we know them to-day, and gives a long explanation of how the error occurred, in the course of which he says that it had been impossible to detect it until Linnæus' specimen was available for examination.[10] From that time Fabricius' name *edusa* has stood for our "Clouded Yellow," but in one of the most recent authoritative publications, Seitz's "Macro-lepidoptera of the Palæarctic Region" (p. 68), it has been superseded by *croceus* of Fourcroy, an obscure French writer who published an "Entomologia Parisiensis" in 1785, just two years before Fabricius published his "Mantissa Insectorum," and happened to appropriate old Ray's words. However, for present purposes, I shall perhaps be better understood if I still use the name *edusa*.

Although these old chroniclers may have given us some difficulty in finding out what species they were dealing with in their writings, they have, now that we are able to understand them, at least given us some of the earliest available information as regards the occurrence of *C. edusa* in this country. It is pretty certain that if it was taken near an inland town in Essex and at Cambridge, as related by Ray, it must have been fairly common at or about the time that he was writing, now just over 200 years ago, and Moses Harris' remark that it had been "taken in plenty on Epping Forest,"[11] is equally significant, while Donovan's remarks are sufficiently interesting to be quoted *in extenso*. He says, "With us it has ever been esteemed a rare insect, though seen this season in Kent in greater plenty than for several years; but as they were probably only an accidental brood, they may again disappear for a considerable time."[12] This must refer to the year 1792 or 1793. Then we have definite records of its occurrence in greater or less abundance in 1797, 1804, 1808, 1811, 1818, 1822, 1826, 1831, 1835, 1836, 1839, 1843, 1844, 1855, 1856, 1857, 1859, 1864, 1865, 1867, 1868, 1869, 1875, 1876, and then came the memorable year 1877. The species had been locally common in the two preceding years, and then in 1877 it spread over the whole country in the greatest profusion, extending even as far north as Orkney.[13] Another year of great abundance was 1892, but unlike 1877 the advent was particularly sudden, there being no records, so far as I have been able to ascertain, either for 1890 or 1891. Since that time we have had many years of bounty and of scarceness, but none so remarkable as those of 1877 and 1892.

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[7] Moses Harris. "The Aurelian," 1766 ed., p. 61, pl. xxix.; 1794 ed., p. 54, pl. xxix.

[8] Lewin. "The Insects of Great Britain," vol. i., pp. 68-70, pls. 32 and 33.

[9] Donovan. "The Nat. Hist. of British Insects," vol. ii., p. 17, pl. 43.

[10] ,, ,, ,, ,, ,, ,, ,, vol. vii., pp. 57-61, pl. 238.

[11] Moses Harris. "The Aurelian," 1766 ed., p. 61; 1794 ed., p. 55.

[12] Don. "Nat. Hist. of Brit. Insects," vol. ii., p. 18.

The authors who followed Donovan during the first half of the nineteenth century appear to have had no very strong views on the reasons for the insect's erratic appearances. Curtis (1832) simply writes, "it is said that *C. edusa* visits us every three or five years; however this may be, it is certain that it is occasionally abundant in various parts of the kingdom, although for several years successively not a specimen will be seen."[14] Westwood (1841) says, "This is one of those species of butterflies whose periodical appearance (every three or four years, as stated by some writers) has so much perplexed Entomologists. Various opinions have indeed been suggested by authors, in order to account for this singular circumstance —such as the failure of their natural enemies, the Ichneumonidæ, or insectivorous birds—an increased temperature, or the dormant state of the eggs until called forth by some latent coincidences. All these opinions are, however, but merely conjectural; nor can the matter be cleared up until a more minute enquiry into the habits of the species has been made."[15] While Humphreys (1859) remarks, "Its abundance once in three or four years has not been satisfactorily explained."[16] It would therefore seem that the train of thought at this period was that the species by some mysterious agency was of common occurrence at stated periods, some seeking to show that it was at intervals of three, four or five years, according to their fancy, but no one apparently taking any great amount of trouble to solve the mystery.

In 1867 Buckler obtained ova from June parents, and had no difficulty in rearing a full autumn brood from them; and ten years later he repeated the experiment with ova from August females, but from his notes the result is not very clear; some few reached the pupa stage by the end of October, but what subsequently happened to them is not stated.[17] Although this did not give any great amount of useful information, it at least established the fact that it was easy to rear the species during the summer months, and the opportunity was taken of its comparative abundance in some subsequent seasons to carry through further experiments, in which the members of this society appear to have played a conspicuous part.[18] It is perhaps hardly necessary to follow these through in detail, but it may be briefly stated that they showed conclusively that a summer brood was exceedingly easy to rear, but that as soon as the weather began to cool in the autumn, difficulties arose with any brood of larvæ that was then feeding, the inference being that a certain amount of warmth and sunshine was necessary for the well-being of the larva. Cold weather appears to be equally fatal to the pupa, comparatively few of those that assume that state late in the year producing imagines, but it has been found that by keeping them artificially in a temperature fully as warm as they would experience in nature in summer, they may be induced to complete their metamorphoses even in winter, and arrive at maturity.[19] The egg-stage does not appear to be capable of any great prolongation, lasting only from one to three weeks, according to the temperature at the time of year at which the ova happen to be laid; and although it has been stated that the eggs are laid in spring by hybernated females,[20] I can find no satisfactory record of the species ever having hibernated in this country as an imago. The inference, therefore, appears to be that in no stage can the species hibernate, in the sense of remaining in a dormant condition through a protracted period, and that our long, and sometimes severe, winters, would therefore more often than not prove fatal to it; in other words Britain is not its true home.

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[13] Dale. "The History of our British Butterflies," pp. 30-31.

[14] Curtis. "Brit. Entomology," vol. v., p. 242.

[15] Humphreys and Westwood. "British Butterflies and their Transformations," p. 15.

[16] Humphreys. "Genera and Species of Brit. Butterflies," p. 3.

[17] Buckler. "The Larvæ of the Brit. Butterflies," vol. i., p. 9.

Colias edusa, at any rate so far as concerns its westerly distribution, is essentially a Mediterranean species. It breeds regularly in northern Africa and southern Europe, in the warm southern Alpine valleys and other similarly suitable inland places, gradually becoming less common as one goes north, until in northern Germany it is regarded as rare and uncertain in appearance; yet it may be found, sometimes not uncommonly, in Scandinavia, and has been seen careering over the Alpine glacier passes at an altitude of at least nine thousand feet;[21] but in such places it is evidently no more at home than it is in Britain. It is, therefore, to the Mediterranean region that we must look for any reinforcement of the species that is likely to produce those seasons of extreme abundance that have been witnessed in Britain from time to time. That migration on a large scale does take place among the butterflies there is abundant evidence, and that the Pierids are among those affected has been amply demonstrated;[22] as to *C. edusa* it is perhaps not quite so clear, yet we are not without some facts to go upon. It is recorded by Darwin that, "One evening, when we were about ten miles from the Bay of San Blas, vast numbers of butterflies, in bands or flocks of countless myriads, extended as far as the eye could range. Even by the aid of a telescope it was impossible to see space free from butterflies . . . . More species than one were present, but the main part belonged to a kind very similar to, but not identical with, the common English *Colias edusa*."[23] Then we have Malden's note written in June of the great *edusa* year of 1877, in which he says, of the individuals seen at Brighton on the 6th, "They appeared just landed from France, and were easily caught; they were flying inland for several days; the females were by far the most numerous."[24]

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[18] "Proc.," 1895, p. 83; 1896, p. 25; 1901, p. 107. "Entom.," vol. xxv., p. 201.

[19] "Entom.," vol. xxvi., p. 60.

[20] "Entom.," vol. xviii., p. 21.

[21] H. Rowland Brown. "Butterflies and Moths At Home and Abroad," p. 111.

When considering the question of the immigration of butterflies, we are far too apt to jump to the conclusion that they would arrive by the shortest sea route at the Strait of Dover, but to my mind this is quite unnecessary. Far more probable is it that they would follow a course similar to that taken by the great northern streams of migrating birds. For many years the migrations of birds have been very closely studied, and from a vast number of observations made continuously at innumerable stations, it has been clearly established that they follow certain fixed routes, of which two appear likely to apply in a modified form to the present case. The more westerly route, starting from the north-west corner of Africa, passes along the coasts of Portugal, north Spain and western France, to Ushant, where it divides, a portion breaking off to our Irish and Cornish and Devon coasts, the remainder following along the north and west coast of France, and giving off streams towards our south and south-east coasts. The more easterly has its origin at various points along the north African coast, and crosses the Mediterranean either to the south-east coast of Spain, along which it passes, or by the islands of Sardinia and Corsica, or by way of the south-west coast of Italy, all three joining up on the south coast of France, thence passing up the Rhone valley, it picks up the valley of the Rhine, and thus reaches the coasts of the Netherlands and northern France, where it joins up with the western route, streams being thrown off to our Kentish and eastern coasts.[25]

Although such evidence as we have in regard to *C. edusa* in this connection may not be very conclusive, there are certain fragmentary records that, when considered as a whole, are not without significance. First with regard to the great year 1877. For the

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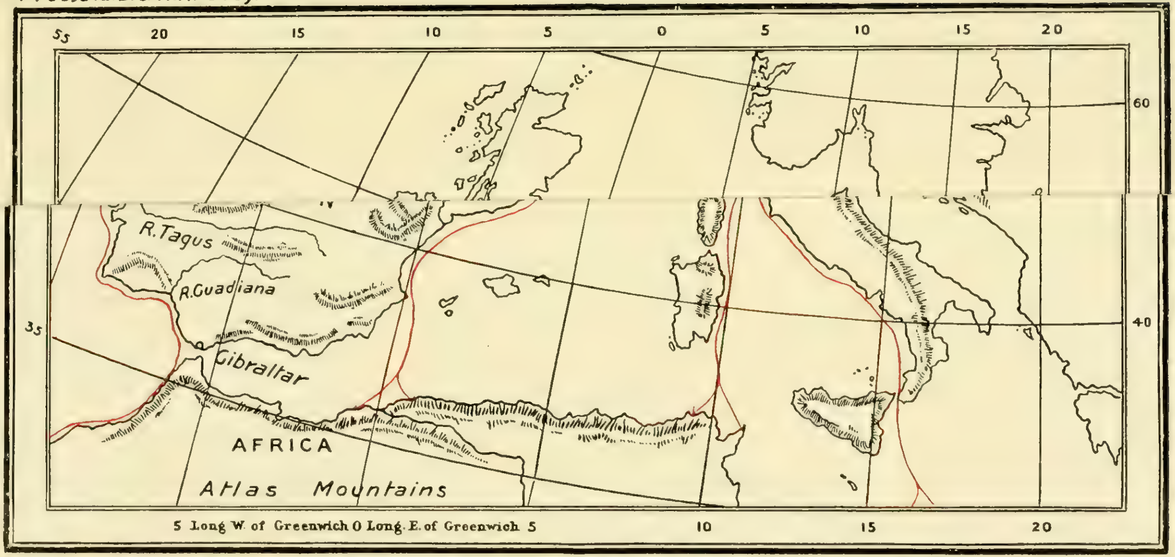
[22] "Ent. Mo. Mag.," vol. vii., p. 18; vol. ix., p. 246. "Proc.," 1899, p. 47.

[23] Darwin. "The Voyage of H.M.S. Beagle," p. 158.

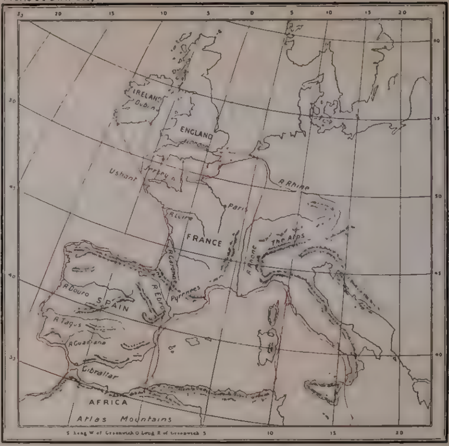
[24] H. C. Malden, in "The Field." "Ent. Mo. Mag.," vol. xiv., p. 40.

[25] Eagle Clarke. "Studies in Bird Migration," vol. i., p. 72.

Proc. S.L.E. & N.H. Socy.



SUGGESTED LINES OF MIGRATION
(After W. Eagle Clarke)



SUGGESTED LINES OF MIGRATION
(After W. Eagle Clarke)

preceding year, 1876, the only spring records are from the west—Dublin, Plymouth and Pembroke;[26] and in the autumn it was reported as common in the west also—South Wales and Cheshire;[27] the only other record being from Lewes, Sussex, where it is said to have occurred in some numbers.[28] The following winter we are told was exceptionally mild, and in 1877 the species was more abundant throughout the British Islands than perhaps it ever has been either before or since, but it is significant that McLachlan reports, after enquiry of the leading entomologists of the country, that the species had not been observed in Belgium,[29] while Meldola tells us that during a fortnight's collecting in the Rhine valley he saw certainly not more than four specimens; that during a week's collecting near Hamburg he did not see one, and later, on a journey through France to Paris only about six, yet on returning to Deal the insect was in profusion.[30] In 1885, a year when *C. edusa* occurred at many places in the south of England, generally very sparingly, but in fair numbers in some few favoured spots, we are told that around Cork, Ireland, "the country was swarming with it."[31] In 1892, a year of abundance in Britain, perhaps second only to 1877, it is recorded as "an unusual event" that *C. edusa* was seen in numbers in the Channel Islands at the end of May.[32] These records, though admittedly inconclusive, appear to suggest strongly that whatever immigration does take place is by similar routes to those taken by the birds, crossing the Channel in a northerly direction at many parts, from its mouth upwards, rather than only by a westerly passage at the Strait of Dover.

Now, whatever part immigration may play in the economy of *C. edusa* in Britain, I do not for one moment suggest that the species may not exist in this country for successive years without its aid. Take the last fourteen years, 1900 to 1913 for example, and we find that in only one of them, *viz.*, 1910, is there no record of its occurrence, in some two or three of them it has been fairly common, but in the majority it has occurred but sparingly, and only on or near the warmest parts of the south coast. I have myself noted it in one sheltered nook at the eastern end of the South Downs in nine out of the fourteen years, and on two of the others it was recorded from places so near as to suggest that it could hardly have been really absent from my particular spot, although I had not met with it. As to 1910, the only year of the series for which I can find no record, the preceding winter was generally milder than usual, but with two or three spells of dull, very cold weather, one of which occurred during the first week in April, possibly a very critical time in the creature's existence. But we really know very little of the effect of local meteorological conditions upon the species; and this is a point that might very well be taken up by some of our stay-at-home country members.

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[26] "Entom.," vol. ix., p. 182. "Ent. Mo. Mag.," xiv., p. 65.

[27] "Entom.," vol. ix., p. 256.

[28] "Entom.," vol. ix., p. 217.

[29] "Ent. Mo. Mag.," vol. xiv., p. 66.

[30] "Ent. Mo. Mag.," vol. xiv., p. 110.

[31] "Entom.," vol. xviii., p. 322.

[32] "Ent. Mo. Mag.," vol. xxviii., p. 191.

In regard to its occurrence in the locality that I have just mentioned, I have repeatedly noticed a habit of the species that it may be convenient to mention here The spot is a particularly sheltered one, facing almost due south, and consists of rough banks and steep down-lands more or less covered with natural herbage; except at one end where some few acres have been under cultivation for more years than I can remember. This cultivated portion was last sown, now some years ago, with lucerne, a crop that is particularly attractive to *C. edusa*. Yet during the whole of my experience, whether *C. edusa* has been abundant or comparatively scarce, and whether the lucerne has been a full crop, or, as now, a few straggling plants among the coarse herbage that is gradually overrunning the patch, *C. edusa* has always been proportionately far more common on the rough uncultivated down-land than on that which was cropped with the lucerne. In situation there is nothing to choose between the two, and they are divided only by a rough track that for all practical purposes is no division at all. I cannot help thinking that the insect is attracted to the rough uncultivated land as offering advantages for carrying through its metamorphoses, which that which has been under the plough does not. How often, too, in the lean years, do we hear of its occurrence in the Isle of Wight, where the broken ground to the west of Ventnor, untouched by cultivation, appears to harbour it, as do also the rough sheltered nooks of the southern coasts of Devon and Cornwall. It is from such places that one more often than not gets the stray records in the years when the species is not generally common in this country.

Variation also must not be disregarded, but a very few words need be said on the subject. In Britain we have one outstanding recurrent form of the female, *viz.*, var. *helice*. Usually it is not relatively very common, but in some seasons of great abundance it has been noted in the estimated proportion of approximately one of the variety to twenty of the type. In some of the more southern countries of the insect's distribution this variety is said to occur almost as frequently as the type. In the four cases that have come under my notice, in which eggs obtained from var. *helice* have been reared to maturity, the proportion of the females bred have been five *helice* to one *edusa*: four *helice* to one *edusa*: one *helice* to one *edusa*; and fifty-two *helice* to nineteen *edusa* = nearly three to one respectively;[33] figures which appear to suggest that in years when the variety has been unusually common in this country, the stock from which they arose must have been of southern origin. Other than

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[33] "Ent. Rec.," vol. xxvi., p. 49. "Proc.," 1905, p. 75.

helice we have no fixed recurrent varietal forms, but a host of trivial aberrations; thus, there may be considerable variation in the tone of the yellow ground colour, which in some individuals is much lighter than others. It was to a small-sized individual of one of these lighter forms that Stephens erroneously gave the name of *chrysotheme*.[34] Indeed, the colour varies from a rich deep orange to almost sulphur, and occasionally one meets with a blending of the two tints in one individual, as in the case of a typical orange specimen with a sulphur line along the costa, and so forth. Then there is a good deal of variation in the size and shape of the black spot on the disc of the forewings, and in the amount of the black suffusion at the base, which in some specimens extends practically over the whole of the wings; also in the width and intensity of the black borders, and occasionally the hindwings have a distinct pink flush. In the female there is very great variation in the amount of yellow spotting in the black borders, specimens occurring rarely in which the borders are practically immaculate; but these all appear to me to be mere accidental aberrations and not to have any bearing upon the status of the species in this country.

Although I have been able to adduce little that is new, such fragments as I have been able to string together appear to suggest that without immigration *C. edusa* would soon be extinct in Britain; that in the countries nearest to the east of us the species has little, if any, better chance of continuous existence than here, and that any reinforcement of our stock must come from more southern climes. We need not tax our credulity to the extent of imagining individuals rising from the sunny coasts of Algeria and alighting on our inhospitable shores; there are many warm valleys in southern France and Spain where swarms might originate, and once on the move easily reach us by some such routes of migration as already suggested. Or if, as there is some evidence, insects on migration rise to great heights,[35] and are borne involuntarily on the upper wind currents, who can say from how great a distance they might come? Then there is also the possibility, although I do not know of any evidence to support the suggestion, that migration may be progressively carried on through several succeeding generations. For instance, if an early spring brood in the southernmost haunts of the species commenced a northern movement, it might be continued by successive generations through a whole season, without the species exceeding the limits of the area in which it thrives; each generation, by reason of the introduction of fresh blood as it proceeds on its course, gathering force, so that at the final movement beyond the area, the species would be at its greatest strength, thus allowing of an enormous number of individuals setting out on the final migration to the districts of its casual distribution such as northern Europe and Britain.

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[31] Steph. "Ill.," vol. i., p. 11, pl. ii., figs. 1 and 2.

[35] See *Plusia gamma*, "Proc.," 1890, p. 77.

What then are our conclusions? We can hardly claim *C. edusa* as a permanent resident, although we suspect that it may, at times, exist in this country for successive years, but this is a point on which we need more direct evidence. Be that as it may, its habits when here, the circumstances surrounding the times of its greatest abundance, even the features of its variation, all seem to point to the migratory propensities of the species, and, so far as concerns Britain, its distant origin, but here again we want to know something more definite. Even the negative evidence supplied by McLachlan and Meldola in 1877, had its significance, and now that so many of our members are in the habit of making excursions into the adjacent districts of the palæarctic area, is it too much to hope that they will put on record their experiences of this interesting species, and thus, in co-operation with those whose energies are confined to this country, assist in the definite elucidation of one of the most interesting problems of the British Lepidopterous fauna?

Luminous Insects.

By K. G. Blair, B.Sc., F.E.S. *Read May 28th*, 1914.

The power of emitting light at night is a property that has been developed to varying extent in many different branches of the animal kingdom. We find it, for instance, in the Protozoa, *e.g.*, *Noctiluca*, an organism which, though microscopic in size, is sometimes present in such countless millions on the surface waters of the ocean as to make the whole sea appear to be ablaze with a pale, cold, "phosphorescent" light. Higher in the animal scale we find the property well developed in the Hydrozoa, *e.g.*, *Pyrosoma*, a colonial oceanic form. We have it again in numerous molluscs, in the insects, and even in the vertebrates, a large number of the fish that inhabit the abysmal depths of ocean, where the sun's rays can never penetrate, carrying their own lamps disposed about their bodies in patterns that vary according to the species.

To-night, however, I propose to consider only the insects that exhibit this power.

There is, as might be expected considering the striking nature of the phenomena in question, a very extensive literature on the subject. This is for the most part scattered throughout numerous scientific periodicals, but the earliest part of it, up to 1887, has been collected together by Gadeau de Kerville in his "Insects Phosphorescents," published in that year.

It is rather remarkable that the beetles (Coleoptera) have almost a monoply of light emission amongst insects, and even here the property is almost confined to two families. The first and by far the most important of these for our consideration is the Lampyridæ, or, to give them their popular name, the Glow-worms and Fireflies. With them are associated one or two small closely allied families, the Phengodidæ, Rhagophthalmidæ, etc., some of which are as yet very imperfectly known and unsatisfactorily characterized. In the Lampyridæ proper the luminous organs, when present, are generally found in both sexes, though frequently more strongly developed in one than in the other, and are situated in the terminal or subterminal segments of the abdomen, the light being shown from the ventral surface.

All members of this society are familiar with the glow-worm of this country, *Lampyris noctiluca*. It has frequently been the subject of exhibition at our meetings, and its habits and life-history have recently been illustrated by Mr. Main in his beautiful series of lantern slides, some of which have been reproduced in our Proceedings.

To recapitulate briefly, I will remind you that in this species in the adult stage the light-giving property is practically confined to the female. Destitute of wings, she is rather an unlovely object, doomed to crawl about amongst the grass and low herbage, while her prospective spouse enjoys the freedom of the air above her. Yet her light is emitted from the underside of her tail, a situation that would not at first sight appear to be particularly well chosen as a source of illumination. Her *modus operandi* in exhibiting her light is usually to climb a little way up some convenient stem and to sit there with her lamp suspended, her body twisted a little to one side so as to exhibit the light without obstruction. If she can find no stem stiff enough to bear her weight she will remain with her body on the ground, the abdomen twisted to one side to expose the light as freely as possible, turning it first to one side then to the other in her attempts to attract the attention of wandering males. At Lugano Mr. Main and I have observed that they were particularly partial to old walls, even sitting ten or twelve feet above the ground. Though we found the larvæ fairly plentiful in the grass the female beetles were always on the walls, and in such a situation their light was plainly visible from a long distance; the twisting motion of the abdomen was also clearly observed.

Luminous organs are present in the male glow-worm in a similar situation, but to a very minor degree. The extent to which they are functional possibly varies in different localities; at any rate Fowler quotes Mr. Dillwyn as saying that around Swansea he has "not observed the small light in the males which is always sufficiently obvious about Dover." In the New Forest, where I have taken them on the wing in some numbers I do not remember ever to have noticed any light, but my observations at the time were very casual. It is probable that in this sex the light is emitted only for a comparatively short time after reaching maturity, and that it soon becomes exhausted.

Photogenic organs are also present in an advanced degree in both the larva and the pupa; even the eggs are luminous, though there is here no definite light organ, but the whole surface glows faintly.

To the same family belong the "Fireflies" of southern Europe. Of these there is a considerable variety of species, which possibly present slight differences in the details of their light emission. One of the best known is *Luciola italica* of northern Italy, a species whose habits Mr. Main and I had the pleasure of studying at Lugano.

Luciola italica was observed on the evening of our arrival at Lugano, in the grounds of the school, near the lake. We had seen no signs of them at Baveno, but had scarcely an opportunity of observing them, having been driven in early by the rain; later that evening we found them in the grounds of the Washington Hotel, and our observations on them throughout the week were confined to that area.

Though abundant after dark, they were scarcely to be observed during the day. On one occasion a single male was taken by Mr. Ashdown by sweeping herbage, and an hour or more spent before dinner one evening in searching carefully the grass and low vegetation in the garden produced a single female (our first). Enquiries of the gardener as to whether he ever came across them in or about the ground while at work, produced nothing more than the statement that they were not there during the day, but only appeared after dark. Asked what became of them during the day, they simply were not there!

The first flashes were observed about 8.30, while the lingering daylight was fairly strong, and they were most numerous about 9.30 or 10, after which time their numbers noticeably decreased, though they could still be seen from our bed-room windows well after 11 p.m.

As was to be expected, all the fireflies caught on the wing were males. They have a fairly steady, not very rapid, flight, and flash their light at almost regular intervals, but they do not obviously appear to be searching for the females. When they do perceive an answering flash—and the discovery seems to be a matter of accident rather than the result of deliberate search—they pause in their course, and then fly down to it, although they may be as much as ten feet away.

The females were never observed to use their wings, but were always found on the grass or the herbage. In these insects, unlike the American *Photuris*, etc., observed two years ago, the initiative in seeking a mate appears to be with the female, as in the case of *Lampyris*. At times they will be quite dark, while sometimes they will glow with an almost steady, though not very bright, light. When "calling" for a mate, however, they flash with rather long slow flashes, incompletely extinguished in the intervals. Such a period of flashing is usually of short duration, and is succeeded by a dark period. It is this succession of slow flashes that bears the appearance of definitely calling for a mate, and during which the males most readily approach her, though they are also attracted to some extent by a steady glow.

Though the light of the female was sometimes observed, or the insects found paired quite early in the flight period, yet they were much more conspicuous later, when the numbers of the males had considerably decreased; probably this was due to the females making more or less desperate efforts as the competition became keener.

The male on going down to a female alights somewhere near by, but appears to be a little uncertain of her exact whereabouts, and to grope his way towards her, flashing his light as he goes. At the same time the flashes of the female are few and far between, so that it is not uncommon to find a female perhaps on one side of a leaf and the male on the other, unable to find one another; after a time he sometimes gives it up and flies away. If, however, he successfully locates her he climbs upon her back, and both insects cease flashing. If another male flies by, the female may call to him and attract him also, but our observations on this species hardly confirm those of Emery on the "Lucciole," when he found that they would collect into groups, each consisting of one female surrounded by several males. Neither do we agree as to the long period that elapses before actual copulation takes place. We frequently noticed this act after only a few minutes, and at all times during the flight. Sometime the insects, *in cop.*, were found to be sitting tail to tail along a stem, but not always. They were also noticed to flash occasionally when *in cop.* The operation is not of long duration (at any rate in captivity), and they part again, and one female will pair more than once in one evening.

The males, both in captivity and in nature, *i.e.*, when caught in a spider's web, were observed to glow with a constant though not very brilliant light, somewhat resembling the steady light of a female, but no case of flying males approaching these dead males was observed. In captivity, if kept damp and without food, they would live about a week.

Eggs were laid pretty readily, in irregular batches, about the bottom of the box. They are round, salmon-pink in colour, and a number together were faintly luminous in the dark, though this was hardly noticeable in single individuals. They were ·026 inches in diameter. They hatched about July 20th, the young larvæ being at first very pale, but soon darkening almost to black. They fed readily on chopped up slugs or snails, and would gather in numbers round each piece, radiating out from it all round with their bodies trailing away to one side so that each collection resembled a small catherine wheel. As they filled out with feeding they seemed to lose their blackness, in part at any rate, owing to the horny plates being separated from one another by soft pale intervals, the horny plates themselves, however, seemed to become browner and less shiny. About the middle of August they began to change skin, but in this respect Mr. Main's seemed to be much more uniform than my own. On August 27th he showed me a number all obviously in the same skin, though some were older and fuller than others, but he was positive that none had moulted twice. My own, though fewer in number, were not so carefully observed, but I felt positive that some of them had changed twice.

The young larvæ are plainly, though not very strongly, luminous at night, and although unicolorous in their first skin, after their first moult there were two distinct round spots on the penultimate segment. After moulting, they were at first again quite pale, then became almost black and shiny, with the two last segments paler than the rest. As they fed these characteristics appeared to diminish, as noted in their first stage.

These observations differ in various details from the account given by Emery* of a species of which he does not give the name; he asserts that the light is emitted by the female only in response to the flashes of a passing male, also that the insects remain for a long while together before copulation takes place. Though he never observed this action, he supposed that it only occurred late at night after he had been compelled to retire from watching them. The mating habits of many American species of Lampyridæ, popularly known as Lightning-bugs, have been investigated recently by McDermott.† In these insects, as in the European *Luciola*, both are luminous, and the light is emitted as a series of corruscating flashes. Again, the male has the more brilliant light, but in these insects he seems to take the initiative in searching for a mate, hovering over the ground flashing his lamp, and apparently watching for an answering flash from the less active female concealed in the grass.

The Lightning-bugs investigated by McDermott belong mainly to the genius *Photinus*, of which the species are numerous, two or more of them often being found on the same ground. The results of this investigator's observations, assisted by a series of ingenious experiments with small electric bulbs which could be operated to simulate the flash of the insect, conclusively show that each species has its characteristic method of exhibiting its light, and that an individual of any one species will in general only reply to, or evoke a reply from, a member of the opposite sex of that species. He found, however, that some species would respond much more readily to his artificial flashes than others, and that some would even answer the flash of a match.

A few details of his observations on certain species may perhaps be quoted:—

Photinus pyralis.—The flash of the female is given three or four seconds after that of the male, and is of the same colour, but of longer duration and less intense.

Females would answer in numbers to the flash of a match swung in an arc to simulate the flash of a male, though as a rule not more than one female would reply to a flashing male.

A particular female would not reply to the flash of a male of another species (*P. consanguineus*) though she would to that of a match.

The male could also be deceived by a bulb placed in the grass and flashed three to five seconds after his own flash; when the bulb was flashed without the pause it was not so effective.

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* "Bull. Soc. Ent. Ital.," 1886, p. 406.

† "Canad. Entom.," 1910, pp. 357-363; 1911, pp. 399-406; 1912, p. 73 and pp. 309-312.

No male was ever observed to reply to the flash of a creeping male.

P. consanguineus.—The male gives a double flash, two flashes in quick succession followed by a pause, then two more, and so on; the female replies within a second to the second flash of the male.

A particular female would not reply to the flash of a match, but would answer the double flash of a bulb when twenty or thirty feet away; on a nearer approach she seemed to recognise something unusual and would no longer reply.

P. scintillans.—The male gives a short single flash and the female a longer single flash; the female in this species is apterous.

A female would reply to the first flash of a male of *P. consanguineus*, but the latter takes no notice.

P. marginellus.—The male gives a single short sharp flash, yellower than that of *P. scintillans;* the female replies with a double flash, the first sharper and brighter than the second, followed at once by the second. The reply is given very quickly after the flash of the male.

P. castus.—The male gives a single flash, not so short and sudden as that of *P. marginellus;* the female gives a single flash very much like that of *P. scintillans*, but delivered immediately after the flash of the male; there is no distinct pause as in *P. pyralis*, and no indication of doubling as in *P. marginellus.*

P. castus and *P. marginellus* are very similar, and indeed by some authorities have been considered to be merely forms of one species. Mr. McDermott admits that he can find no points of structural difference between them, but considers them distinct species on account of the very different flashes emitted by them. They are frequently found flying together, but no case of interbreeding has been observed, though especially watched for.

In connection with these lightning-bugs a brief experience of my own may be of interest, but since at the time I had no intention of writing this paper I failed to make as good use of the opportunity for observing them as I could now wish to have done. Two years ago I paid a short visit to the United States, and for the first time met any of these winged and flashing glow-worms, and the sight of them in their thousands sparkling in the woods and meadows made an impression on me that can never be erased. Not knowing at the time of McDermott's work on them I thought I would investigate the functions of the light in the courtship of the sexes, but beyond finding that they all appeared to be males I could make nothing out of them; each beetle was visible merely as a succession of sharp flashes, and the emission of the light was apparently quite aimless. In the course of a visit to Washington I mentioned my fruitless efforts to Mr. H. S. Barber, of the National Museum, and he told me of the researches of McDermott, and most kindly offered to go with me that evening and see if we could make out anything of the sort for ourselves. We arrived on the ground before sunset, and very shortly afterwards observed the first flashes of the lightning-bugs. Owing to the lingering daylight the flashes appeared very feeble, and for some time we were able to observe the motions of the beetle itself apart from the flash of its lamp. It would remain hovering over the grass, rising and falling gently the while, reminding one somewhat of the dancing movements of a mayfly above the surface of a stream, and at each dip flashing its light. These were the males searching for the females, and occasionally we were able to detect the answering flash of a female in the grass below. As the darkness increased the flashes became brighter, and we were distinctly able to detect differences in them; some would be redder or yellower, and others greenish, some sharper, others more prolonged, and by capturing the sources of them we found that we had three different species, *Photuris pennsylvanicus*, *Photinus pyralis* and *P. marginellus* (?), all flying together over the same ground, and with very little practice we were able to recognize each species by its light alone.

The time of courtship of these insects is apparently brief, and is for the most part over by the time it has become really dark. The insects then rise higher from the ground and fly more actively about, so that by the time the fireworks display is at its brightest it is too late to observe their mating habits. No doubt the main reason for my previous failure in this direction was that I did not start early enough in the evening. Unfortunately, this night at Washington was the last occasion that I had for observing them at all, so that I was unable to proceed any further on the lines of McDermott's researches.

Mr. E. E. Green* has published notes on the use of the light by certain species of luminous beetles in Ceylon. Of these, one, *Lamprophorus tenebrosus*, Walk., belongs to the Lampyridæ properly so-called. The female of this species is apterous with a ventral subterminal light-organ which she exposes much in the manner of our glow-worm. The male, though normally brilliant, approaches a "calling" female with the light shut off, its advent being heralded only by the partial extinction of the light of the female.

The other species mentioned by Mr. Green present certain marked differences from normal Lampyridæ in the emission of their light as well as in structural points, and have been placed in a separate family, Rhagophthalmidæ. Concerning the light of *Dioptoma adamsi*, Pasc., Mr. Green notes the larviform female was observed to recurve the body over the back so as to expose the ventral subterminal light organ. On the approach of the male the light was partially eclipsed and the tail turned down. The male at the time was not known to be luminous, but under the stimulus of sexual excitement, it was observed to exhibit a row of luminous spots along each side of the abdomen, as well as dorsal spots on the abdomen and across the base of the thorax.

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* "Trans. Ent. Soc.," 1912, p. 717.

I have recently received from my friend, Mr. Gairdner of Bangkok, some females of a glow-worm which, he reports, turn up their tails to exhibit the light in a similar way to *Dioptoma*. Like the female *Dioptoma*, too, they are of a more degenerate type than *Lampyris* females, the antennæ and legs being small and feeble with a reduced number of joints.

The species is also represented in the British Museum Collection by some undetermined females, and some larvæ from Perak must be at least very closely allied. The latter have a well-developed, probably luminous, plate on the ventral surface of each of the abdominal segments from the 2nd to the 8th, an arrangement not known among lampyrid larvæ. The male of this species has not yet been ascertained, but as *Dioptoma* forms one of an anomalous group of small genera, which for the most part are known only by the males, it is probable that it will turn out to be one of these.

Allied to these and to the Lampyridæ is another small family, the Phengodidæ, many of the members of which possess very remarkable luminous properties. In Brazil and Argentina for example, is an insect that on account of its peculiar scheme of luminosity, has long been known as a "railway" larva. The head of this creature glows brightly with a red light, like a live coal, which is more or less intermittent in character, while along each side of the body is a row of more constant lights, green or yellow, or even changing at intervals from a bluish to a more yellow hue. For many years these "railway" larvæ were nothing more than a puzzle to entomologists. On account of their light-giving powers they were usually considered to be lampyrid larvæ, though nothing else like them was known. Still less were they like the larvæ of the only other known luminous coleopterous family, the Elateridæ. The astonishment was great when in 1885* it was announced that the botanist, Hieronymus, had found one of these so-called "larvæ" mated with a beetle belonging to the genus *Phengodes*. Eggs were obtained from it which in due course produced larvæ, thus proving that the supposed larva was in reality the sexually mature, though degenerate and completely larviform, female of a beetle.

We are now confronted with the very interesting question as to whether the apterous, more or less larviform, state of the females of many of these glow-worms is a primitive condition or the result of degeneration from an earlier higher winged type. Riley† states that the female larva of *Phengodes laticollis* and *Zarhipis riversii*, both North American species, goes through a pseudo-pupal state prior to the final moult. It appears, therefore, that this larviform female is a mature though degenerate female, and that we have not here to do with a case of pædogenesis; *i.e.*, of the larva becoming sexually mature without the attainment of somatic and metamorphic maturity.

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* Haase, "Sitzung. Natur. Ges. Isis.," p. 10; and "Deutsche Ent. Zeit." xxxii., p. 154; "Camb. Nat. Hist. Ins.," Pt. ii., p. 251.

† "Ent. Mo. Mag.," xxiv., 1887, p. 148.

The same writer considered that we here "get a glimpse, so to speak, into the remote past, from which has been handed down to us, with but little alteration an archetypal Hexapod form which prevailed before complete metamorphosis had originated." Were this really the case, it is difficult to account for the occurrence of a pupal state in the individual development of the female, though this might perhaps be interpreted as a partial transference from the metamorphosis of the male. Further, if the larviform condition is to be explained as a case of arrested development and the persistence of a primitive type, either one would expect to find it fairly constant in a group of closely related species, and genera evidently arising from a common ancestry, or it must be considered as a kind of throw-back or reversion to an ancestral type.

For my part I prefer to regard the theory of degradation from an earlier winged type as affording a better explanation of the facts as we find them. We have the successive stages in such degeneration all illustrated, from the fully winged though sluggish female of *Luciola*, through the brachypterous state found in the females of certain species of *Photinus*, down through the apterous but otherwise developmentally mature females of *Lampyris*, and the more degenerate type of female of *Dioptoma* to the completely larviform females of *Phengodes*. The steps in this series do not imply relationship or common ancestry, but merely indicate the points, successively further and further back in the phylogeny of the group, when the use of the wings in the course of any particular line of development was discarded and their consequent degeneration set in, or to put it briefly, that the apterous condition is of polyphyletic origin. I know of no instance among the Lampyridæ, such as we have amongst Lepidoptera with apterous females (*e.g.*, *Anisopteryx æscularia*) where, though wings are wanting in the adult, there are well developed wing rudiments in the pupa, but I have found one female of *Lampyris noctiluca*, with the wing and wing-cover well developed though shrivelled on one side of the body.

With the question of the evolution of the apterous female is bound up the question of the evolution of the power of luminosity. Many members of the family Lampyridæ are probably not luminous at all. Pale yellowish abdominal spots are almost always to be detected in the region of the luminous organ, but whether the species possessing them are always luminous is open to doubt. Our knowledge of the habits of many of these insects is extremely defective, and it is frequently impossible to say from dried specimens whether a species is or is not luminous.

In most of the luminous species the eyes, particularly of the males, are extraordinarily large and well developed (*e.g.*, *Lampyris*, *Photinus*, *Luciola*, etc.), but the antennæ are simple. In the non-luminous species, on the other hand, the eyes are of more normal size, but the antennæ of the male are frequently strongly plumose (*e.g.*, *Cladodes*, *Lamprocera*, etc.), a feature that in this order as in the Lepidoptera is usually regarded as indicative of a highly developed sense of sex-perception in this sex, correlated with the possession of sluggish and retiring habits on the part of the female. It is noteworthy that in the genus *Phengodes*, both the plumose antennæ of the male and the powers of luminosity of the female are unusually well developed.

Undoubtedly the chief function of the light is in securing the mating of the sexes, but that this is a secondary function only is evidenced by the different degree to which the use of the light is developed. Its wide occurrence within the family proves that the power of emitting light must have arisen early in the evolution of the family, though exactly how it originated is impossible to say. Possibly, it may have served at first as an indication of unpalatability, common to both sexes[*], and then, coming under the influence of sexual selection as an evolutionary force, have developed along the various lines we see indicated. In connection with their unpalatable qualities, it may be noted that the Lampyridæ is a family that has many mimics in other families of beetles, amongst the Telephoridæ for example, and the longicorns. Species of the longicorn genera *Amphionycha* and *Dadoychus*, even go so far as to have a ventral pseudo-luminous patch resembling the luminous patch of the fire-flies, but in the allied genus *Alampyris*, where the dorsal mimicry is quite as close, this patch is lacking.

The light may also have a certain bionomic value on the principle of "warning coloration," or it may even serve to scare away enemies. A case is on record[*] of a firefly in India alighting near a couple of rats which at once scampered off. It has been noted, too, that the Indian bottle-bird will plaster some of these insects about the entrance to its nest, but this is, perhaps, by way of ornament, rather than to scare away would-be depredators.

On the other hand, in Jamaica, the bull-frogs are known to eat them, and Henslow speaks of a cat that would search for and eat glow-worms.

Apart from its principal function in securing the proper mating of the sexes, the light seems also to be largely used, at any rate by the males, for purposes of display. Where the powers of luminosity are largely developed in this sex the emission of the light is usually of an intermittent flashing type. It has been noticed in various parts of the world that these flashing males tend to congregate in large companies, and that all the individuals of one of these gatherings will flash in concert. All the fire-flies around one tree or group of trees, for instance, will flash together, while those around a neighbouring tree will be pulsating to a different time. This feature has been observed of a European species of *Luciola* (though Mr. Main and myself were unable to detect anything of the sort with *L. italica* at Lugano), of an Indian lampyrid, genus not stated, and of the genus *Aspidosoma* in South America. The American species of *Photinus* and *Photuris* do not seem to possess the habit.

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[*] Henslow in "Nature," 1879, p. 220.

The exact reason of this flashing in concert, or the method by which it is brought about have not been ascertained. It has been suggested that the light is not really intermittent in character, but merely appears so owing to its being alternately masked and exhibited by movements of the creature's body, and that a slight puff of wind might perhaps affect all the members of a company and cause them all to conceal their lights at once. Though this explanation of the intermittent character of the light applies well enough to *Pyrophorus*, an insect we shall shortly consider, it is certainly not applicable to these Lampyridæ. It is true the light is not absolutely extinguished between the flashes, but it is so diminished as to become practically dark; moreover the flashing in unison is too regular to be caused by chance puffs of wind. A more probable explanation of the phenomenon is that each flash exhausts the battery as it were, and a period of recuperation is required before another flash can be emitted. It is then conceivable that the flash of a leader might act as a stimulus to the discharge of their flashes by the other members of the group, and so bring about the flashing in concert by the whole company.

The physical and chemical nature of the light of these insects have been the subject of numerous investigations. Though often spoken of as "phosphorescent," the light has nothing whatever to do with the oxidation of phosphorus.

The most recent conclusions are those of Dubois, and were summarized by him in a communication to the Zoological Congress at Monaco last year. He finds that the mechanism for the production of light is the same throughout for both plants and animals, and is the result of the action of an oxydising zymase upon an organic proteid product in the presence of water. In the case of luminous insects the proteid, which he calls *luciferine*, is contained in the form of granules in the photogenic organ, while the zymase, to which he applies the name *luciferase* is dissolved in the blood. The light is given off by the action of the luciferase on the luciferine as the blood passes through the luminous organs. This zymase can be replaced experimentally by a chemical oxydizing agent such as permanganate of potash, lead dioxide, hydrogen dioxide, etc.

The luminous organs in these insects are found on dissection to be abundantly supplied with tracheæ, which open by means of very large spiracles. It is probable that by opening or closing these spiracles the insect is able to regulate the supply of oxygen to the luminous organs, and so in some degree to control the emission of light.

Though in many species the flashing of the male is so regular as to suggest its being due to reflex rather than to voluntary action, yet in the female the light appears to be more under the control of the insect. In many species the light may be emitted after the death of the insect, but in the case of males of the flashing species the light is then constant instead of intermittent and less intense than in life. While searching for the females of *Luciola italica*, I was several times deceived by the constant faint light of a dead fire-fly caught in a spider's web near the ground.

Another group of beetles whose light-giving properties have caused them to be very widely known—at any rate by name—are the "Fire-flies" of Tropical America, *Pyrophorus*. These must not be confused with the "Fire-flies" of Italy and southern Europe, which as I have said are really winged glow-worms allied to the lightning-bugs of the United States. The fire-flies of tropical America and the West Indies, the creatures that the local belles wear in their hair and about their persons as a kind of living jewellery known locally as Cucujos, belong to a very different family, the Elateridæ or Skip-jacks. They are considerably larger than the glow-worms and their light organs are differently situated. The most obvious are a pair of large yellowish spots on the thorax, one near each of the posterior angles. If the beetle is examined alive, these spots, the "eyes" as they are called, will at first be quite dull and opaque; but when the insect is handled they will soon be observed to kindle, the glow increasing gradually in intensity till it reaches its maximum. This light is only emitted by the fire-fly when stimulated by some excitement, such as that caused by handling, and glows steadily so long as the excitement continues; as this wanes the light gradually dies away.

When the insect is on the wing the light seen is not that emitted from these eye-spots, but originates from another light organ at the base of the abdomen. This organ is usually concealed between the abdomen and the thorax, and is only exposed when the elytra are open so that the abdomen can be bent back. The light is of a redder or yellower colour than that emitted from the thoracic spots, and is intermittent instead of continuous, the flashes being caused by the light being alternately exhibited and concealed by slight movements of the abdomen. The bionomic value of the light in these insects is not at all understood, but it does not seem to have any sexual function in this case.

The larvæ of these fire-flies are also luminous. They are of typical elaterid form and live in rotten wood. In the young larvæ the light is emitted from the junction of the head with the body, but in the older larva it is emitted also from the junctions of the segments all along the body. The eggs also are stated to be luminous.

Various beetles of other families have been recorded as luminous, but all these records want confirmation, and some of them were certainly only accidental.

Mr. J. C. Moulton, of Sarawak, when looking through some cabinet drawers of longicorns, remarked as though it were a well known fact that the spots on the elytra of certain species of *Batocera* were luminous; he hopes to make more exact observations on this point. His own observations referred to *B. calanus*, Parry.

Species of the genus *Paussus* have been recorded as giving out a light from the antennæ, but Westwood in his monograph on this genus considered that this was probably light merely reflected from the highly polished surface of the joints of these peculiar organs. My friend Mr. K. G. Gairdner, writing from Siam, states what has already been well known, that they make a crepitating noise*, but says nothing of any light.

Reiche reports that the volatile discharge emitted by *Brachinus* is luminous at night.

Nebria brevicollis and *Ocypus olens* have also been reported to be luminous, but this was almost certainly due to the accidental adherence of some luminous matter to them.

Yet another insect well known on account of its supposed luminous properties is the "Lantern Fly." It is one of the bugs, Rhynchota, and belongs to the homopterous division of this order.

The first account that we have of this singular insect is given by a certain Nehemiah Grew, in his Catalogue of the Museum of the Royal Society, 1681. He says of it "that which beside the figure of the Head is most wonderful in this Insect is the shining property of the same part, whereby it looks in the night like a little Lanthorne. So that two or three of these fastened to a stick, or otherwise conveniently disposed off, will give sufficient light to those that travail or walk in the night." This account is accompanied by a very passable figure of the insect.

The most circumstantial account of the luminous properties of this insect is due to Madame Merian, who described them from Surinam about 200 years ago. She tells us that some Indians having brought her one day some of these insects, she shut them up in a large box, not knowing that they were luminous in the dark. During the night she heard a noise, and, getting out of bed to discover the cause of it, found that it proceeded from this box. Opening it, she was so astonished at seeing the apparently flaming insects that she dropped the box and allowed the insects to escape into the room.

Now this lady was a most enthusiastic naturalist; from her childhood she had been exceedingly fond of botany and entomology, drawing the various species that she found. She had travelled extensively in Europe in search of subjects for her pen and pencil, and when fifty-two years of age went to South America in search of further material. On her return to Europe after several years' residence there, she published her celebrated book "Dissertatio Insectorum Surinamensium" (1719.) Here she figures the various insects dealt with in the different stages of their life-history, together with their foodplants and their parasites.

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* This is caused by a discharge from anal glands as in the 'bombardier' beetle and other Carabidæ.

I give you these details to show that the lady was, for her time, a person with a very considerable knowledge of her subject, and her word is not to be lightly disregarded. We may, therefore, believe that she saw what she describes, although a possibility remains that she may have seen and be drawing upon Master Grew's account of the same insect. Almost certainly, however, her story is perfectly bona fide evidence, yet many qualified naturalists have vainly sought to confirm her statement. It seems certain that in the ordinary way these insects are not luminous. In certain circumstances they may normally become so, or they may become so in a diseased condition. Mr. Distant has suggested* that the presence in their bodies of luminous bacteria in large numbers may be the cause of the phenomenon. The luminescence of certain crustacea (*Talitrus*) has been proved to be due to such pathologic reasons, as has that of certain midges; and the absence of any definite light-organ in these lantern-flies seems to confirm the theory that the light must *be due to some extra-normal* conditions. Kirby and Spence mention the case of a mole-cricket, which was taken to be a will-o'-the-wisp, and chased and eventually captured, and its identity established. This at once opens up another question that is rather shrouded in mystery, *viz.*, how far the peculiarly elusive light sometimes observed over wet marshy ground, and going by the name of will-o'-the-wisp, jack-o'-lantern, or *ignis fatuus*, is due to mole-crickets or other bacterially luminous insects. I do not propose to enter now into a discussion on this subject, but it certainly seems to be one worthy of investigation by entomologists. Luminosity in the midges has been reported on several occasions, chiefly from Eastern Europe. The species concerned are *Chironomus plumosus* and *C. tendens*, and the luminosity, which is sometimes very bright, embraces the whole body and its appendages, and is entirely independent of the will of the insect, persisting for some time after death, even in alcohol. The insects exhibiting the light are always in a moribund condition, sitting upon the bushes, from which if shaken they merely drop to the ground unable to fly. It is supposed that this is a case analogous to that of the amphipod crustacean *Talitrus*, which is sometimes found to exhibit a similar kind of luminosity. In this case the body of the infected animal has been found to be swarming with bacteria, which are the actual source of the luminescence. Search has been made for bacteria in the luminous *Chironomus*, but in no case was the material sufficiently well preserved for bacteria to be recognizable. In "Ent. Mo. Mag.," 1885-6, vol. 22, p. 266,

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* Distant, "Trans. Ent. Soc.," 1895, p. 429.

Meyrick records finding a luminous Dipterous larva in New Zealand on the steep earthy banks of a creek. Mr. G. V. Hudson in a further note ("Ent. Mo. Mag.," vol. 23, p. 99) states that the insect inhabits irregular cavities in the bank, where it hangs, suspended in a glutinous web, which also appears to envelop its body. The light in this case proceeds from a large glutinous knob situated at the posterior extremity of the larva. He suggests that the light may assist the larva in escaping from enemies, as when disturbed they nearly always gleam very brilliantly for a few seconds afterwards, then suddenly shut off the light and retreat into the earth. A fly bred from one of these larvæ turned out to belong to the Mycetophilid genus *Trimicra*.

The fly *Thyreophora cynophila*, which is metallic-blue with a large orange-red head, is said to be nocturnal in habit and to feed on dead bodies by the light of its phosphorescent head (see "Entom. M. M.," vol. 15, p. 43).

We have also records of luminosity in two species of Ephemeridæ, *Teloganodes tristis*, and *Cænis dimidiata*; in certain Termites; in some Australian ants, *Iridomyrmex detectus*; and in some hairy lepidopterous larvæ from Parana supposed to belong to the family Nymphalidæ. These larvæ also possessed very violent urticating properties.

To sum up, nearly all the cases of luminous insects, and *all* those that are in any way well-known and common, belong to the order Coleoptera, and even here almost entirely to the family Lampyridæ. An exception to this statement is found in the elaterid genus *Pyrophorus*, but other records all require confirmation. In the Lampyridæ the light plays an important part in securing the mating of the sexes, but its functions in other luminous beetles have not been satisfactorily explained.

In other Orders of Insects luminosity is rarely met with, at any rate in the normal condition of health; little or nothing is known of the part that it plays in the life of the animal, indeed its very existence apart from what we may call accidental causes, is usually more or less problematical.

The *Sea Shore* and its Plant life.

By E. J. Salisbury, D.Sc., F.L.S. *Read October 8th*, 1914.

The great French philosopher Bergsen has probably done more than any other writer to emphasise the constant and never ceasing change that often underlies superficial stability, and perhaps nowhere than in the realm of nature are we so apt to mistake for permanent condition the successive phases of progress or retrogression. In dealing with Coastal Vegetation we cannot divorce our study of the plants themselves from a consideration of the habitat in which they live. For the habit, mode of growth, life-history, and internal structure of the various species are most intimately related to the diverse conditions of their environment. It is more especially the ever changing character of the Sea Coast and the relation which its denizens bear to this special condition that I wish to lay stress upon. The Royal Commission on Coast Erosion did much towards focussing public attention upon our coastal gains and losses. But even now, except in a few striking instances where the sea annually advances to an appreciable extent, the fact is overlooked that along our whole seaboard, encroachment either by sea or land is constantly proceeding. At one point the change is secular, at another rapid, but everywhere the same great battle; and it is always where the fight is fiercest that vegetation most prominently plays it part.

It is the plants that are the most important factors in reclamation, and though we so often think of coast protection in terms of groynes and breakwaters, these imposing and expensive structures are often far less effective than the plastic barrier set up by the vegetation.

It is probably not too much to say that the time will come when we shall combat the natural forces of erosion by a carefully directed utilization of the plants which, having found their home and flourishing under these specialized conditions, have become peculiarly fitted for this warfare in which they are constantly engaged.

The following is a brief *resumé* of the subject matter of the lecture.

The Sand Dune.—The chief conditions of this type of habitat are: the mobility of the soil; the large size of the soil particles, involving lack of retentiveness and capillarity, and deficiency of humus. The adverse factors encountered by the vegetation are then three: (1) shortage of water, (2) burial by sand, (3) mobility of soil. The last named is met by rapid fixation due to the growth of the plants themselves, of which there is a constant succession, each type carrying on the work of the preceding forms. The shortage of water is met by (*a*) an extensive root system; (*b*) by storage of water in the plant tissues to bide over periods of drought; (*c*) by a reduced vegetative period corresponding to the wet season (ephemerals); (*d*) most commonly by a more or less marked reduction in water loss by various devices such as sunken stomates, thick cuticle, hairs, rosette habit, etc., tending to check transpiration. Burial by the sand is a regular feature in the early phases of dune formation, and the plants which thrive under these conditions are species in which burial only stimulates further growth, so that with every fresh layer of sand a constantly enlarging branch system is produced, each accretion thus bringing about its own fixation.

Dunes originate as small heaps of sand around a seedling of *Psamma* or *Triticum*; these, by their repeated growth, as the dune increases, form a skeletal system that knits the whole together. As the young dunes grow in size lateral fusion takes place between them and the isolated units become merged into a dune system. Further stabilization of the surface is brought about by the sand binders, such as *Carex arenaria*, *Convolvulus soldanella*, and *Festuca arenaria*. These are capable of extensive growth in the horizontal direction, and thus in a single season can ramify over a considerable area. At this stage the arrival of ephemerals (*e.g.*, lamb's-lettuce, whitlow grass, *Cerastium* spp., *Phleum arenaria*) not only more completely protects the surface by the close carpet of leaves which they form, but also, by their decay, add considerably to the organic content of the soil and therefore to its water-retaining capacity. By this time the dune has become sufficiently stable to afford a foothold for lichens and mosses. These complete the clothing of the surface and add still more rapidly to the increase of humus, so that eventually these grey dunes become colonized by shrubs (elder, blackthorn, etc.), and become incorporated with the mainland. Throughout the period of stabilization, however, dunes are always liable to erosion by winds which blow out the sand from unprotected surfaces. In this way retogression phases are brought about that can only be checked by the use of artificial protective devices. Preventive measures can also be adopted, such, for example, as the destruction of rabbits whose burrows, by exposing the surface, render dunes vulnerable to wind action.

We find a similar phenomenon of stabilization by the plants of the shingle beach. Here the chief *rôle* is played by the sea-campion and sea purslane, though many other species contribute to the vegetable complex which knits the surface layers. There is abundant evidence to show that shingle banks, such as that at Westward Ho, Aldeburgh, and the great Chesil Bank, tend to travel landwards. The richer the vegetation the slower will be this process;

and the abundance of vegetation appears to depend largely upon adequate supply of organic material in the form of drift. Probably the most effective plant in preventing the advance of shingle is the shrubby sea blite (*Suæda fruticosa*), which in its reaction to burying by shingle is similar to the pioneer sand-dune plants. The value of this species is very evident on some banks where the regions of landward advance correspond to gaps in the protective zones of *Suæda.*

The most conspicuous source of accretion is that due to the action of the Salt Marsh Plants. The earliest colonizers of the sand and mud are in this case filamentous seaweeds that ramify between the submerged soil particles, reducing their mobility and tending to trap further deposit. The algæ are followed by the saltworts which again give place to such plants as sea aster, sea plantain, thrift, and sea lavender. With the increasing density of vegetation there is a corresponding increase in level, and to this the sea manna grass (*Glyceria maritima*) contributes greatly. Here again, we have a plant that exhibits repeated growth when buried, and the mat-like turf, which its vegetative organs form, is not only an efficient trap for further additions of silt, but also an admirable protection for that already deposited. Eventually the level is raised above that of all but the highest tides, so that further rise is dependent upon the slower accumulation of organic débris, or in some cases silt carried down by drainage from the land. The Salt Marsh flora eventually becomes replaced by that of the mainland. Such low-lying reclaimed land is to be seen around many parts of our coast furnishing some of the best pasturage in the country.

British Long-horned Grasshoppers.

By W. J. Lucas, B.A., F.E.S. (*Read December 10th*, 1914.)

On previous occasions I have read to this Society papers on two of the subdivisions of the Orthoptera—the Forficulodea* (Earwigs) and the Acridiodea† (Short-horned Grasshoppers). This evening I ask for your indulgence while I introduce to your notice another subdivision—the Locustodea, or Long-horned Grasshoppers.

Were we living in some region to the south or east of the Mediterranean it would probably not be long ere we made acquaintance with a swarm of locusts and saw the amount of damage they are capable of doing. It might naturally be supposed that the insects I wish to speak about were relatives of these unwelcome marauders; so I will preface my remarks by saying that the latter have nothing whatever to do with the former. The locust swarms, which sometimes devastate wide regions in climates warmer than our own, are Short-horned Grasshoppers, belonging therefore to the Acridiodea. There exists, it must be admitted, a great deal of confusion with regard to the names of the larger divisions of the grasshoppers and crickets, but we are perfectly safe in asserting that the locusts are not locustids; in other words, they do not fall within the Locustodea at all.

It is usual to divide the Orthoptera into seven groups or sub-orders as follows:—

1. *Forficulodea* (Earwigs, etc.).
2. *Blattodea* (Cockroaches).
3. *Mantodea* (Praying Insects).
4. *Phasmodea* (Stick Insects).
5. *Gryllodea* (Crickets).
6. *Locustodea* (Long-horned Grasshoppers).
7. *Acridiodea* (Short-horned Grasshoppers).

We may define the Locustodea as:—*Orthoptera with hindlegs longer (often much longer) than the forelegs or midlegs, and having the femora thickened at the base; tarsi of four segments; fore tibiæ generally provided with an "ear" situated just below the knee, the "musical" apparatus, (when present) being found on the basal part of the elytra of the male; antennæ very long and slender (there being more than thirty segments); ovipositor usually long and sword-shaped; many wingless species.*

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* In 1912.

† In 1913.

Fifteen families are usually given as comprising the Locustodea :—

W. B.[‡] 1. Phaneropteridæ.
W. B. 2. Meconemidæ.
3. Mecopodidæ.
4. Prochilidæ.
5. Pseudophyllidæ.
W. B. 6. Conocephalidæ.
7. Tymphanophoridæ.
W. 8. Sagidæ.
W. B. 9. Locustidæ.
W. B. 10. Decticidæ.
11. Callimenidæ.
W. 12. Ephippigeridæ.
13. Hetrodidœ.
14. Gryllacridæ.
W. 15. Stenopelmatidæ.

While eight of these families are represented in Western Europe, but five extend so far as the British Isles—Phaneropteridæ, Meconemidæ, Conocephalidæ, Locustidæ, and Decticidæ. Nine species only are certainly known to be natives of Britain. One of these, however, *Phasgonura viridissima*, finds a place in the typical family, our Locustodea having in this respect an advantage over the Acridiodea, the typical family of which group contains no British species. Our nine representatives compare very unfavourably in number with those found in Western Europe, which sum up to over one hundred and sixty. There is apparently only a single reliable record of a locustid from Scotland.

At present I have not met with the eggs of all of our locustids, but in several cases they may be described as rather long curved cylinders with rounded extremities.[§] Those of *Leptophyes punctatissima*, however, are much compressed and elliptical in outline. With her formidable scythe-shaped ovipositor the female places the eggs below the surface of the ground in the case of some species, within the twigs or stems of plants in that of others. They are laid in the autumn and apparently hatch in the spring. After some half-a-dozen ecdyses the perfect stage is reached in late summer. There is little post-embryonic development and a pupa-stage is absent, the insects being nymphs from the time of leaving the egg till the perfect state is reached. The wings become more pronounced at each ecdysis after their first appearance; many species, however, remain wingless throughout their life. As a rule Locustids are sedentary and nocturnal as compared with the Acridians.

While the latter are herbivorous insects, the former are not entirely so, and examples kept in captivity often become cannibals. It may be even that some species are entirely carnivorous.

[‡] W. = represented in Western Europe ; B. = represented in the British Isles.

[§] Vide. "Entomologist," vol. xlvii., 1914, p. 144.

Like the Acridians the locustids are musical; but the "musical" organs and "ears" are situated quite differently in the two groups. In the locustids the ears are on the forelegs. The left elytron has a file on its inner surface, while the right one has a sharp edge on a part of its inner margin. These constitute the musical organs and are found in the males only, except in two non-British families. When the elytra are rapidly vibrated the sharp edge passing under the file produces the "musical" sound. In species in which the elytra are greatly reduced, it is this part which remains.

Though colour, size, and wing-development are not good points on which to differentiate species, yet our nine natives are easily separated by such means, so I shall make no further excuse for drawing up a table on these lines. It must, of course, be used for no other purpose than for identifying the British species.

British Locustids.

A. Wings reduced to vestiges.		
(*a*) Bright green, with minute black spots	*15mm.	*Leptophyes punctatissima.*
(*b*) Ruddy brown	18mm.	*Pholidoptera griseoaptera.*
B. Winged.		
(*a*) Clear green.		
(i.) Size small	13mm.	*Meconema thalassinum.*
(ii.) Size large	33mm.	*Phasgonura viridissima.*
(*b*) Green with dark spots on elytra	35mm.	*Tettigonia verrucivora.*
(*c*) Brown	21mm.	*Metrioptera albopunctata.*
C. Half-winged.		
(*a*) Brown, with pale margin *all round* flap of pronotum	17mm.	*Metrioptera roeselii.*
(*b*) Brown, with pale *posterior* margin to flap	17mm.	*Metrioptera brachyptera.*
(*c*) Pale green, with crimson-brown dorsal surface; very slender species	16mm.	*Conocephalus dorsalis.*

Leptophyes punctatissima, Bosc.—A strange-looking insect is our sole representative of the Phaneropteridæ. It is mature in autumn and late summer, when it may be found on shrubs and bushes, a favourite resting place apparently being the upper surface of a bramble-leaf, where, as it is far from agile, it may easily be captured. Other plants, on which it has been recorded as seen, are alder and osier. It has been found at "sugar" (Dixey and Hamm). The strange look of the insect is due to its plump little body (reminding one somewhat of the common spider), its long legs and antennæ, and the almost entire absence of organs of flight. In general colouring it is full deep green, but on a close inspection it is found to be irrorated with a multitude of tiny black spots. A few yellowish and brownish markings also are seen when the insect is examined attentively.

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* Average length of the body of the female from the front of the head to the base of the ovipositor.

Though well distributed in Europe, its range in Britain is chiefly southern. There are records* of its occurrence from Cornwall (C. W. Bracken) to Kent (Burr), and as far as Gloucestershire (J. Edwards), Notts (A. Thornley), and Lincoln (J. F. Musham). Porritt records it from Penmaenmawr in North Wales. It has been taken at Fermoy and Howth in Ireland (*fide* S. W. Kemp), and has once been met with in Scotland, at Luce Bay in Wigtownshire (J. G. Gordon). Specimens kept in captivity fed well on rose leaves and on those of the mountain ash (a rosaceous plant also); but on one occasion one of three placed alive in a glass-topped tin box, disappeared with the exception of small parts of its legs; so evidently the species may turn cannibal on occasion.

Meconema thalassinum, De Geer [= *M. varium*], Fabr.—In this small species we have perhaps the most delicately coloured of our "grasshoppers," if such they may be called, since apparently of their own free will they never leave the trees on which they dwell. Probably their favourite home is the oak or the lime, but they frequent other trees also. *M. thalassinum* is almost entirely pale green in colour, whence, I presume, its specific name; this tint is, however, varied with pale yellow in places. It is fully winged, its build is slender, and its antennæ are long. Noticeable points of structure are the production of the vertex into a projection in both sexes, and the long incurved cerci of the male. I have not kept this species in captivity, but it may safely be assumed that it feeds on the leaves of the tree in which it finds shelter. On one occasion, however, a pair were put into a box without food, when the female was found to have eaten a great part of the male. Whether the victim died first I cannot say. *M. thalassinum* deposits its eggs in the autumn (sometimes as late as November) by thrusting its ovipositor as much as half its length into the bark of the tree on which it resides,† often coming down for this purpose to within a few feet of the ground. Not seldom the eggs are placed in galls of *Cynips kollari*, from which they may be bred.

M. thalassinum is widely distributed in Central Europe; but in the British Isles, judging by the records, its range is rather limited. In England it has been noted from Devon, Somerset, Dorset, Hants (very common in the New Forest), Isle of Wight, Sussex, Surrey (common), Berks, Oxon, Bucks, Bedfordshire, Middlesex, Herts, Kent, Essex, Suffolk, Norfolk, Notts, Northants, and Cambridgeshire. The farthest point north is Doncaster in Yorkshire, where Mr. G. T. Porritt found it commonly. Cornwall does not appear on the list, and I have no records from Wales or Scotland. For Ireland we have a record from Limerick, on the authority of Mr. S. W. Kemp. This species is not averse to the neighbourhood of habitations, for we find it in such places as Kingston-on-Thames, Surbiton, Westwood's Garden in Oxford, Kew Gardens, Hyde Park, etc. No doubt where it occurs it is often plentiful; but as it lives in trees and, being without stridulating organs, is silent, it usually remains unnoticed. "Beating" is the best method to employ for its capture; but it may often be obtained from the lepidopterist's sugar-patch, and in the autumn the females may be captured while ovipositing.

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* In this and other cases the records are such as are known to the author. A strict search in periodicals, etc., would no doubt reveal a few others, and entomologists could with the greatest ease create new ones.

† *vide* "Entomologist," vol. xlv., 1912, p. 116, for a figure.

Conocephalus dorsalis[*], Latr. As with the last two species this is the only British representative of the family to which it belongs. It is far the most delicate in structure of all our grasshoppers. Its antennæ are very long, but its wings and elytra are abbreviated. In colour it is a pale green except along the dorsal surface, which is crimson-brown; its elytra are pale purplish-brown. An interesting male example was taken in August, 1899, by Mr. W. H. Harwood near Clacton-on-Sea in Essex (another being set free) in which the alar organs were fully developed and used for flight. Apparently this is the only record of macropterous conditions in this species. *C. dorsalis* is a water-loving insect, being found on marshy or boggy ground, and on the banks of streams. It is very lively and skilful in hiding on blades of grass by stretching out its long legs in a line with its body, as some long-legged spiders do. If much disturbed it goes down to the roots of the grass and is then not easily recovered. It may, perhaps, be secured by sweeping, but I have found collecting by hand more satisfactory. In captivity apparently it may sometimes turn cannibal.

In Europe *C. dorsalis* appears to be somewhat northern in its range and is not very common. In Britain it is local, though owing to its choice of habitat it may be more common than is supposed. The only localities recorded are in southern and eastern and a few neighbouring counties: there are no records for Wales, Scotland, or Ireland. We have:—*South Devon* (Porritt); *Dorset*, near Studland (W.J.L.); *Hants*, New Forest and Hengistbury Head (W.J.L.); *Isle of Wight* (Burr); *Sussex*, Guestling (E. N. Bloomfield) and Pagham Marsh (H. Guermonprez); *Surrey*, near Witley, 1910 (J. G. Dalgleish); *Kent*, Deal (Porritt); Sheppey (J. R. le B. Tomlin); Blean Wood (A. J. Chitty); and near Eastry (Burr); *Essex*, North Coast (A. S. Harwood), Walton-on-the-Naze (J. W. Yerbury); *Suffolk*, a number of localities chiefly due to C. Morley; *Norfolk*, Horning and Ranworth (J. Edwards); Sutton (F. B. Browne); Broads (Porritt); *Cambridge*, Chippenham and Wicken Fens (Porritt).

Phasgonura viridissima, Linn.—(The Great Green Grasshopper). There can be but few entomologists who have not met with this, the largest but one of our locustids. Its colour is bright green, but with a greater or less amount of ochreous-brown on the fore part of the dorsal surface, that is, head, pronotum, and base of elytra. It is an expert "songster," and will sing in captivity, its song being often more loud than pleasant. *P. viridissima*, is no doubt naturally a vegetable feeder, but it readily turns cannibal. It will bite fiercely when handled, and its powerful jaws are no trifling weapons, particularly as an offensive fluid is discharged from the mouth when the creature is angry. The great green grasshopper often comes to feed on the lepidopterist's "sugar" and also catches any moths that may come in its way. This grasshopper should be sought for on low herbage, nettles, furze, etc. It is local, but no doubt common in places, especially in the South of England. It has been recorded for :—Scilly Isles, Cornwall, Devon, Somerset, Dorset, Hants, Isle of Wight, Surrey, Oxon, Berks, Sussex, Kent, Middlesex, Herts, Essex, Suffolk, Norfolk, Hunts, Northants, Yorkshire and Cumberland. Glamorgan is the only county indicated for Wales, while there are no records for either Scotland or Ireland. The species is well distributed over Europe, and occurs in North Africa, Asia Minor, and elsewhere.

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[*] Both sexes are figured in "Entomologist," vol. xxxii., 1899, p. 289.

Tettigonia verrucivora[*] Linn. (The Wart-biter). It is unfortunate that the finest of our locustids should be at the same time the least common. Stephens ("Illus.," vol. iv.), says that it "once occurred in great plenty in a field near Rochester in September, where it was observed by Professor Henslow, to whom I am indebted for fine examples." Of the brown form, *binglei*, Curtis, he says: "the only examples known of this insect have been taken near Christchurch in the autumn (Curtis says 'July and August, 1818')[†] by the late Rev. W. Bingley and Mr. Dale." A male *bingleii*, probably one of Curtis' types, but of the *green form* (!) is in the Hope Museum (Burr). Mr. C. W. Dale speaks of a fine female (colour not mentioned) taken by his father in the New Forest, July 3rd, 1844. Here I might mention that Mr. H. Bath speaks of a var. *binglii* taken in the New Forest in September, 1891. Mr. Eland Shaw records two green females taken by Mr. H. C. Phillips at St. Margaret's Bay, Kent, in August, 1886, and Mr. H. Bath a green female from Deal in 1889, in which year Burr says two green females were taken at St. Margaret's Bay. Since then Mr. Sandison has taken it in the latter locality, and the late Rev. E. N. Bloomfield informed me that Mr. Gordon Murray took a green female there in 1900. Some seven years ago Burr discovered a colony near Lydden in Kent. He says :—"it requires patience to stalk it down and it chirps only when the sun is hot. Once detected it can easily be followed, as its oily green colour and great long legs make it look like a frog as it makes its huge springs in the long grass." Mr. Porritt found it rare in this locality in 1913. The species occurs all over Europe as well as in Northern Asia. *T. verrucivora* is a bulkier insect than *P. viridissima*, but its alar organs are scarcely so well developed. Moreover, the elytra are much spotted with dark brown. So there should be no difficulty in distinguishing the two species.

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[*] Female figured in "Entomologist" vol. xli., 1908, p. 187.

[†] Some of the records of this species are a little confused; they perhaps require careful sifting.

There now remain three species of the genus *Metrioptera*, two of which are somewhat alike in appearance.

Pholidoptera griseoaptera*, De Geer, [= *Thamnotrizon cinereus*, Gmel.]. This, as well as the remaining four Locustids, belongs to the Decticidæ, a family containing some 150 species. *P. griseoaptera* is almost without a vestige of organs of flight in the female, while in the male but small remnants remain, these being employed as musical organs. Colouring is in general yellowish-brown, speckled and mottled with darker brown; the under-surface is bright yellow, and the alar remnants have a yellowish tinge. The shining ovipositor takes on a ruddy tint towards the tip. In captivity Burr once fed the species on lettuce. No doubt the diet of these grasshoppers is usually a vegetable one, but they are not averse to animal food also. Introduced into a cage with pupæ of the painted lady butterfly, the latter were devoured. When they visit "sugar," as they do, it may be as much for the moths they capture as for the sugar itself.

P. griseoaptera is common throughout northern and central Europe. In England it has been recorded from:—Cornwall, Devon, Dorset, Somerset, Gloucestershire, Herefordshire, Hants, Isle of Wight, Surrey, Sussex, Berks, Bucks, Bedfordshire, Middlesex, Herts, Kent, Suffolk, Norfolk, and Lincolnshire. In Wales, Glamorganshire, and Monmouthshire, are somewhat doubtfully indicated, while there are no records for Scotland or Ireland. Burr considers this a common species, but I doubt if it is so common as he thinks; personally, I have met with it only in the New Forest.

Metrioptera albopunctata, Goeze [= *Platycleis grisea*, Fabr.], occurs practically throughout Europe, but there are not many British localities, and all those recorded are near the sea except one for Derbyshire (G. Pullen, *fide* Rev. F. C. R. Jourdain). It seems to like the rough herbage on a cliff-side, and it has been noted from chalk, clay and greensand formations. It is an active insect, and in such situations is not always easily captured. Other districts are:—Cornwall (Bracken); Dorset (W. J. L.); Hants (W. J. L.); Devon (F. W. Edwards); Isle of Wight (Porritt); Portland (C. W. Dale); Sussex (Morley); Kent (Burr). In colour it is brown, somewhat variegated with paler spots on the elytra. It is sometimes tinged with red. Its larger size and much more ample organs of flight will readily distinguish it from the other two British species of the genus. It has been met with at "sugar." Burr says (1896) he has never heard it chirp.

Metrioptera brachyptera, Linn., is common in central and northern Europe, but its range does not extend to the south. In

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* Both sexes are figured in "Entomologist," vol. xxxii., 1899, p. 289.

England there are but few recorded localities; but these are more scattered than was the case for the last species, and no doubt attention would soon prove it to be more common than it now appears to be. Where I have met with it there has usually been no scarcity. Records are found for:—Cornwall (Edwards); Devon (Parfitt); Hants (W. J. L.); Sussex (Guermonprez); Surrey (W. J. L.); Berks (A. H. Hamm); Kent (W. J. L.); Norfolk (E. A. Atmore); Yorkshire (Porritt); Cumberland (F. H. Day). It appears to like damp or boggy ground, especially amongst heath or heather. More than once I have found it a cannibal. In 1912 I published in vol. xlv. of the "Entomologist" a comparative table, by the help of which this species may be distinguished from the scarcer *M. roeselii*. It is here reproduced:—

M. brachyptera.	*M. roeselii.*
1. Size slightly smaller.	1. Size slightly larger.
2. Colour dark, usually marked with green.	2. Colour somewhat ruddy, without green markings.
3. Pronotum—flat dorsal part rather narrower.	3. Pronotum — flat dorsal part broader.
4. Pronotum—posterior margin of lateral flap pale.	4. Pronotum — total margin of lateral flap pale.
5. Elytra pointed.	5. Elytra rounded or even truncate.
6. Ovipositor of female long, scarcely angled at base, upper edge of blade curved.	6. Ovipositor of female about two-thirds the length of that of *M. brachyptera*, with a sharp bend at base, upper edge of blade more nearly straight.
7. Cerci of male less prominent, tooth near middle of inner edge.	7. Cerci of male more prominent, tooth nearer tip of inner edge.

Metrioptera roeselii, Hagenbach, is an inhabitant of northern and central Europe. In this country it has been found in one or two localities only. In August, 1886, Mr. E. Saunders captured one at Herne Bay, and in August, 1888, Mr. Wallis Kew found it plentiful amongst coarse grass on the sandhills at Trusthorpe, in Lincolnshire. Since 1886 a few other specimens have been taken at Herne Bay by Messrs. H. Guermonprez, H. Campion, and C. O. Waterhouse. In August, 1911, Mr. South took one at Leigh, in Essex. From 1903 onwards, Mr. B. S. Harwood took the species sparingly on another part of the Essex coast. On September 3rd, 1911, Mr. W. West took five specimens on the banks of the Thames below Gravesend. In 1912 Mr. A. Luvoni met with it in two new localities on the Essex coast, and Mr. H. Campion again found it at Herne Bay in August. Finally, in this same year (1912), Mr. Porritt visited Mr. Kew's old locality at Trusthorpe and, notwithstanding atrocious weather, secured a fair number of specimens. In captivity *M. roeselii* will feed on fresh grass.

One or two casuals should be mentioned :—

Phaneroptera falcata, Scop.—One specimen was taken by Dr. Mason in September, 1881, at Porthgwarra, near Land's End. It is a slender species with wings considerably longer than the elytra. In 1907 Mr. W. Daws sent me an insect for inspection, which he took at Sennen Cove, September 11th, 1884. Unfortunately, it reached me in a fragmentary condition, but I have no doubt it was this species. So it may be British after all.

Diestrammena marmorata, de Hann.—In the "Entomologist," vol. xlvii., 1914, p. 145, I published a figure and notes on the occurrence of this large spider-like species, which occurred in a nursery at St. Leonards. I had previously received it from Kew Gardens, and on October 1st, 1913, received decomposing fragments of what I took to be other specimens, which were taken at Ipswich. This is not unlikely to occur again under similar circumstances, and, being an animal-feeder, should prove a useful insect.

Copiophora rostrata, Stål.—One fine female from Kew Gardens.

Copiophora cornuta.—In a hot-house near Birmingham—not the first time it has been taken in this country (McLachlan).

Copiophora *sp.*—In a hot-house at Lee (Billups).

EXPLANATION OF PLATES.

PLATE I.

BRITISH LOCUSTIDS. Females (reduced).

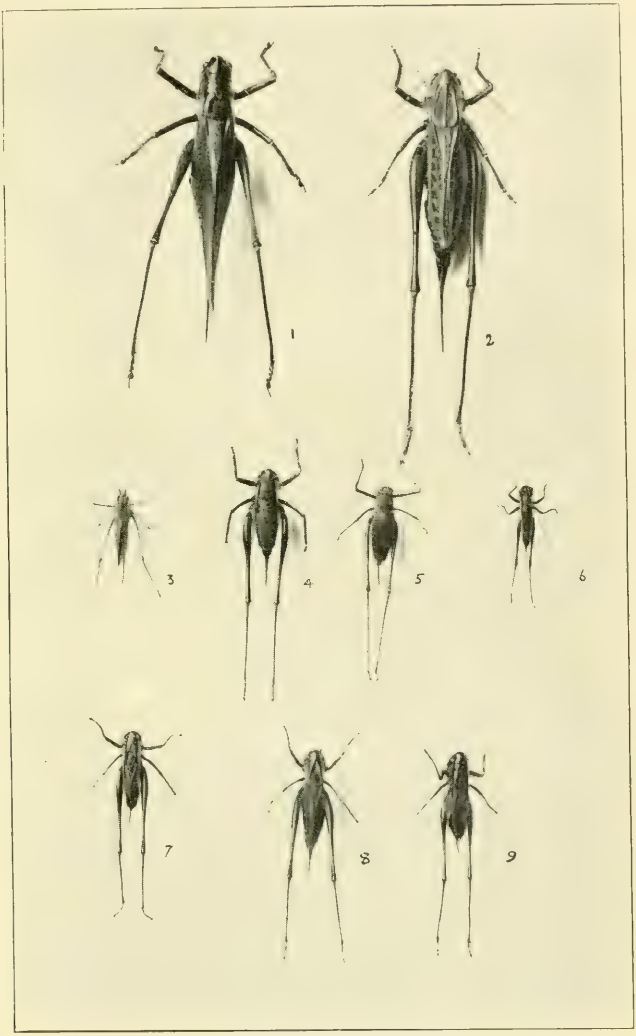
1. *Phasgonura viridissima*, Linnæus.
2. *Tettigonia verrucivora*, Linnæus.
3. *Meconema thalassinum*, De Geer.
4. *Pholidoptera griseoaptera*, De Geer.
5. *Leptophyes punctatissima*, Bosc.
6. *Conocephalus dorsalis*, Latreille.
7. *Metrioptera brachyptera*, Linnæus.
8. *Metrioptera albopunctata*, Goeze.
9. *Metrioptera roeselii*, Hagenbach.

PLATE II.

Phasgonura viridissima, female; wings spread and closed (natural size).

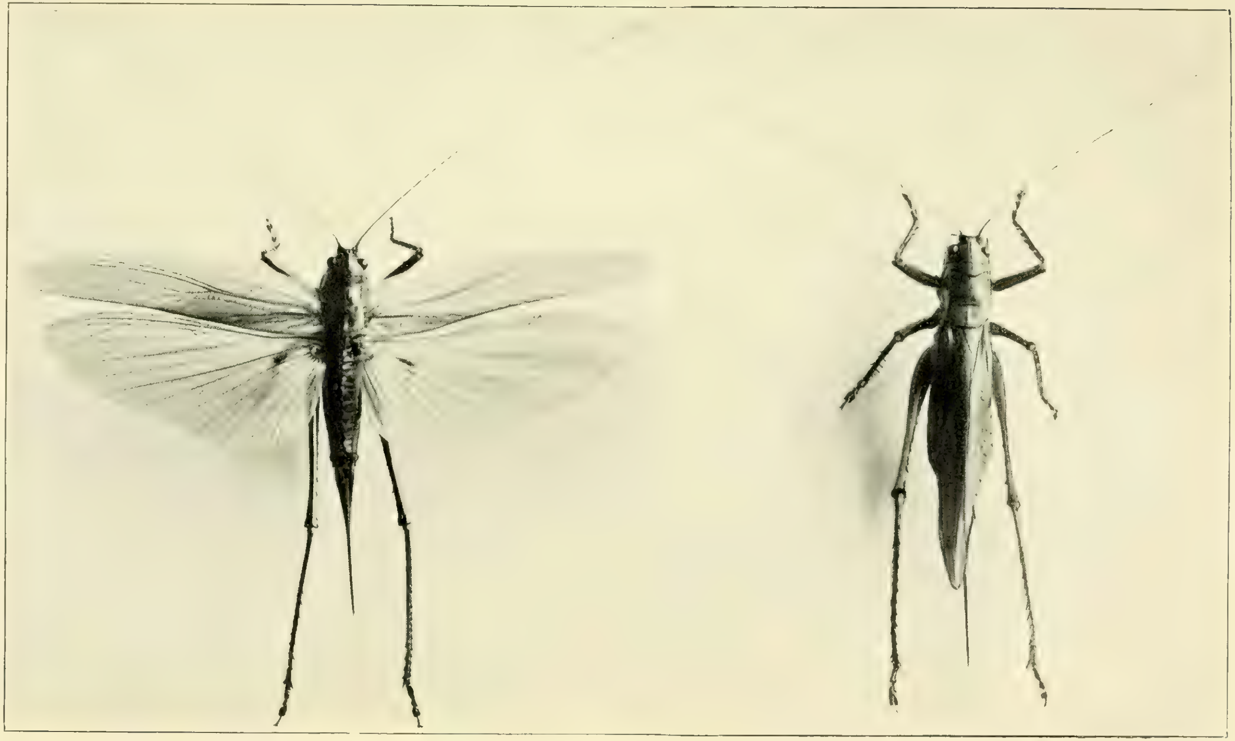
PLATE III.

1. *Metrioptera brachyptera*, male (× about 2·5).
2. *Metrioptera roeselii*, male (× about 2·5).



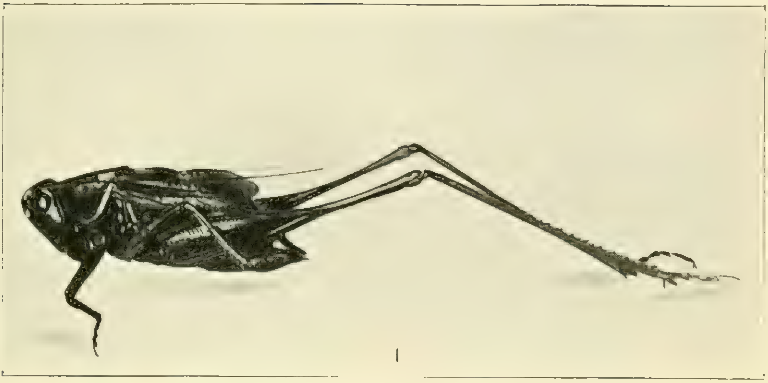
BRITISH LONG-HORNED GRASSHOPPER.

Photo by W. J. Lucas.

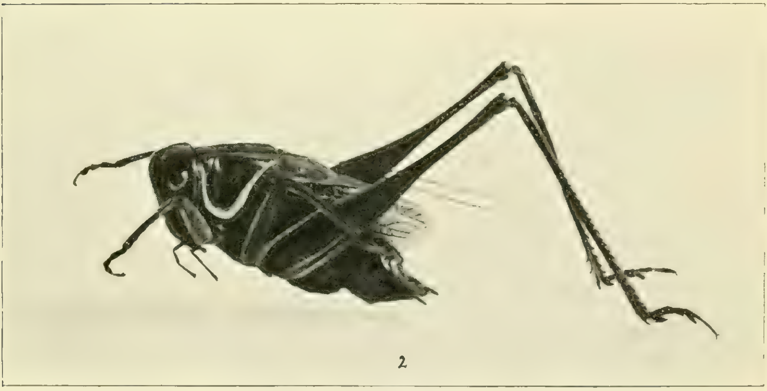


Phasgonura viridissima, female.

Photos by W. J. Lucas.



METRIOPTERA BRACHYPTERA, MALE.



METRIOPTERA ROESELII, MALE.

Photos by W. J. Lucas.

Some Lepidopterous Pupal Habitations and some reminiscences.

By Robert Adkin, F.E.S. *Read January 14th*, 1915.

The life cycle of a lepidopteron consists of four distinct phases, two of which are active, two quiescent. The most active stage is that of the imago, during which the creature, by reason of its wings and legs, is able to move about freely at will, and during its periods of rest is in one way or another more or less protected from its enemies. It is thus able to shift for itself. The imago lays its eggs, and the egg-stage is of all four the most quiescent, and, therefore, during its continuance, the organism is least able to escape any attack of an enemy that may be made upon it; but this is to some extent compensated for, in some species by the positions selected by the imago for depositing the eggs, or other circumstances, or by the vast number of eggs produced (in some of the more prolific species a single female will often lay as many as two thousand eggs),[1] and by all the laws of averages there is a good prospect of some considerable proportion arriving at maturity. Then follows the other active or larval stage, which is perhaps the most important of the four, by reason that it is in this stage that the insect attains its growth; but it is also the most vulnerable. This, however, is again to some extent compensated for by reason of the creature having the power of free locomotion and concealment. The remaining stage is that of the pupa. In this the creature, although not incapable of movement, has no power of locomotion, and therefore must be regarded as quiescent. Now we have already seen that the vast number of eggs produced may allow of a considerable wastage without affecting the status of a species, but by the time the pupal stage is reached the numbers may have been so reduced by losses in the egg and larval stages, that unless some protection is afforded to the pupa the result may be disastrous. Many, varied and interesting are the means taken by the larva to this end, in the construction of the home that is to protect the pupa during the often lengthened period of its existence.

These pupal habitations have from time to time attracted a good deal of attention, first perhaps from a utilitarian rather than from a scientific point of view. It is on record that some four thousand to five thousand years ago the Chinese cultivated one or more species of bombyces for the sake of their cocoons, from which they obtained a threadlike substance, which we now know by the name of silk, and which they wove into a material that they used for clothing. This silk in one form or another enters largely into all, or nearly all, pupal habitations. It may be applied in the form of a fine thread, produced in orderly fashion as in the case of the "silk-producing" bombyces, or as a mere gelatinous mass used to stick together particles of various substances in the construction of the habitation or cocoon in which the pupa is enclosed. It is secreted by the insect during its larval existence from the substances on which it has fed.[2]

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[1] "Camb. Nat. Hist.," vol. vi., p. 397.

Aristotle, who wrote more than two thousand years ago, paid some little attention to the metamorphoses of insects, in the course of which he mentions at least three lepidopterons, two of them being probably *Pieris brassicæ* and *Abraxas grossulariata*, whilst the third is evidently one of the larger silk-producing bombyces, whose cocoon appears to have specially attracted his attention, for of it he says, "From one particular large grub, which has as it were horns, and in other respects differs from the grubs in general, there comes by a metamorphosis of the grub, first a caterpillar, then the cocoon, then the *necydalus*; and the creature passes through all these transformations within six months. A class of women unwind and reel off the cocoons of these creatures, and afterwards weave a fabric with the threads thus unwound."[3]

Coming now to more recent times, the writers of the eighteenth century paid a great deal of attention to the cocoons of the Lepidoptera and the methods of their construction. Thus, Réaumur (1734) gives wood-cut figures of many of them; his delightful, if somewhat verbose description of the manner in which *Hylophila bicolorana* (*quercana*), constructs its cocoon[4] (for although the species is unnamed the description is such as to leave no question as to its identity) is worthy of closer attention by present-day entomologists than we are perhaps generally inclined to give to these older writings. Rösel[5] (1746) figures the cocoons of practically all the species that he describes that make them, while their representations on the delightful plates in Sepp[6] (1762) are as carefully delineated as are those of the imago and larva; and both authors give frequent references to them in the text, evidently attaching importance to the methods of preparation employed by the various species.

In the examples of pupal habitations that I am about to show in illustration of my remarks, I propose to confine myself to British species, and therefore what are generally recognised as silk-producing species are inadmissible. Yet even though we may have none that spin their cocoons in the orderly fashion employed by *Bombyx mori*, that allows of the silken threads being unwound; nevertheless, in many of them the silken threads are there, but stuck together, tangled, or it may be so mixed with other substances as to be difficult to determine.

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[2] It is now common knowledge that a similar substance, known as artificial silk, may be produced by a chemical process from vegetable substances, without the intervention of the insect.

[3] Aristotle. Historia Animalium. Book v. 19, 551*b*. See D'Arcy Wentworth Thompson's Translation. Vol. iv.

[4] Réaumur. Memoires pour servir a L' Histoire des Insectes. Tome 1, p. 559, pl. 39, figs. 8-14.

[5] Rösel v. Rosenhof. Insekten—Belustigungen.

[6] Sepp. Nederlandsche Insecten.

Take the cocoon made by *Saturnia pavonia* for example, a remarkable construction consisting of an inner pear-shaped envelope which at first sight appears to be a tough parchment-like skin, but which, upon examination under the microscope. is found to be made up of numberless silken threads so interwoven and matted together as to form a compact mass giving the skin-like appearance. This is surrounded by a quantity of loose, coarse, silken threads, by which it is attached to twigs or other substances, a conspicuous object enough when detected, yet so hidden among the heather, brambles, or what not, amongst which it is made as to be easily overlooked, or if seen, to be passed over as a bit of detached sheep's wool. The conspicuous, shining cocoon of *Anthrocera filipendulæ* is also constructed of silk, but in this case it is of a very fine texture and so closely woven that it is exceedingly tough, such protection as it may afford to the enclosed pupæ apparently being due to this fact, its usual position, well up a grass-stem, showing no attempt at concealment. (See Plate IV.)

It would be impossible in the course of a short paper to enumerate all the species that build interesting structures for their pupæ. I therefore propose to mention chiefly those that have come under my own notice. The Rhopalocera may be passed over, as practically none of them can be said to construct a "habitation," nor need the larger Sphingidæ detain us, but among the Sesiidæ there are some interesting examples. They are as a rule internal feeders, the larvæ of some of them burrowing in the branches or solid wood of trees, the burrow formed by the feeding larva being used as the pupal home, but the hole at the end of the burrow from which the imago is to emerge is often covered by a "cap" cut out of the bark, this is well seen in the case of *Sesia andreniformis*, also of *Trochilium crabroniformis*. Some others that feed chiefly under the bark make tough pupal cocoons in the ends of the burrows by working some of their gnawings of bark in with the larval silk; of these *Sesia scoliiformis* and *S. culiciformis* are good examples. Those that are root feeders, such as *S. ichneumoniformis* and *S. chrysidiformis*, construct similar but less solid cocoons, generally in the mine or just above it in the crown of the root, not infrequently projecting above it, yet completely hidden by the branching stems or leaves of the plant.

Among the bombyces we find some very remarkable structures, and that of *Hylophila bicolorana* is one of the most interesting. The larva is full-fed in June, and constructs its cocoon on the back of a growing leaf of an oak-tree. When the winds blow, as they often do even in summer, the leaves are driven one against the other with considerable force; and it is, therefore, necessary for the safety of the pupa that the cocoon in which it is contained should be able to withstand the sudden and often considerable pressure that is thus put upon it. This is accomplished by its peculiar shape. It is exactly like an upturned boat constructed of material having the appearance of very thin parchment; the gunwale attached to the leaf, the keel and bilge pieces extending along its back and sides, a construction that gives great rigidity. So long as it is intact it will withstand very considerable pressure, but when the imago has escaped, which it does by splitting up the front end of the cocoon, which corresponds to the bow of the boat, its loses it rigidity and may be easily crushed, thus showing that its resisting power is due to its highly specialized construction, rather than to the material of which it is made.

Earias chlorana, an allied but smaller species, spins a cocoon on somewhat similar lines, but on a much less elaborate scale. The larva feeds in the leading shoots of the osier (*Salix viminalis*), and when about to pupate descends to the hard-wooded branches or stem of the tree, the bark of which it gnaws up and mixes with the material of which it makes the cocoon, the object apparently being concealment rather than great strength. Some years ago I had rather a curious experience with this species. I was staying at Eastbourne, and having collected a considerable number of osier shoots containing larvæ, I put them in a large cylindrical tin which had, I believed, an absolutely close fitting lid. Having to go to London for a few days, I put the tin in a cupboard of a sideboard at the rooms where we were staying. On opening the tin on my return I found the osier shoots well eaten but not a larva was to be seen among them. Naturally, I made a search for them, but could find no wandering larvæ either in or about the cupboard. In the course of my investigations, however, I detected certain slight irregularities in the surface of the wood of which the cupboard was made, and upon closer investigation found that they were caused by the cocoons of the *H. chlorana*. Evidently the larvæ had become full-fed during my absence, and finding no suitable substance within the tin on which to construct their cocoons, they had exercised their Tortrix-like propensities and squeezed themselves through some tiny crevice, where the lid was not an exact fit, in search of a likely spot for pupation—which the soft wood of the cupboard provided. Now the most interesting part of the story has yet to come. This particular cupboard, as is the case with many articles of cheap furniture, was lined with a soft white wood painted over with some pinkish substance, and the larvæ in making their cocoons had so managed to work this in that they matched the surrounding surface so exactly that it was almost impossible to detect them by sight; not so, however, the little white pits that were left after their removal by the aid of the point of a penknife.

Nola albula and *N. centonalis* also build cocoons of a similar nature. *N. centonalis* feeds on leguminous plants, and when about to pupate, at any rate in confinement, seeks some hard substance, such as the twig of a shrub, or a dry grass stem, on which to build its cocoon. *N. albula* in a wild state feeds chiefly on dewberry (*Rubus cæsius*), and no doubt the stems of that plant afford a suitable position for the construction of its cocoon; in confinement it takes readily to raspberry, the stems of which it eagerly seeks for that purpose. I have watched the construction of the cocoon, if not continuously from beginning to end, at any rate at frequent intervals during the process. On the evening of June 13th, a full-fed larva was noticed resting on a piece of the stem of the foodplant, moving its head from side to side in a manner suggesting that it was commencing to construct its cocoon, and on a closer examination it was seen that two narrow parallel lines of silk had been placed longitudinally on the stem, one on either side of the larva; these proved to be the foundations for the side walls of the cocoon. From this time the larva appeared never to leave the position it had taken up, but resting between the two walls, to reach out its head, nibble a fragment of bark from the adjacent part of the stem and weave it in with the silk until the two parallel walls were of sufficient height. This part of the process had been completed by the evening of the 14th, and on the morning of the 15th the ends and tops of the walls had been closed up and the cocoon completed, the whole process having occupied some thirty to thirty-six hours. (See Plate V., figs. 1 and 2).

The Spilosomas spin loose flimsy cocoons among rubbish in any sheltered corner, mixing in the larval hairs, and often portions of the rubbish, which materially adds to their concealment. *S. urticæ* is a good example, especially when placed among moss, as is the case in the specimens exhibited. On one occasion I found nine cocoons of *S. lubricipeda* in the folds of a grey blanket that had been left in a garden shed, the hairy portions of the blanket being so woven into the cocoons as to make a practically exact colour match.

Eriogaster lanestris makes a very special cocoon of a cylindrical egg-ended shape composed of silk, in the outer layer of which a brown pasty secretion is mixed, which makes it very hard and capable of withstanding the wear and tear of the many years during which the majority of a brood often remains in the pupal stage.

Bombyx quercûs constructs a cocoon on very similar lines, but it is, of course, much larger and proportionately less tough. It is no doubt the egg-like shape of the cocoons of these species that has gained for the members of the group the popular name of "egger."

Cosmotriche (*Odonestis*) *potatoria* spins a spindle-shaped cocoon of tough, pale, dull yellow silk on a dry grass stem or thin twig of a bush, and like that of *Anthrocera filipendulæ* it is a most conspicuous object, no attempt being made at concealment, its toughness evidently being relied upon for the preservation of the enclosed pupa.

Eutricha (*Lasiocampa*) *quercifolia*, on the other hand, appears to take some pains to hide its cocoon, a somewhat loose structure of material closely resembling the last named, by placing it in the thick of a hedge or bush often near the ground. It is not often that one has the chance of seeing the cocoon of *L. ilicifolia* in this country; but it will be seen by those now exhibited, part of a very small brood recently reared by Mr. Newman, that they are of similiarly tough material; and in a state of nature one would expect them to be constructed among the branches of bilberry (*Vaccinium myrtillus*), on which the larva feeds, or possibly on the ground between the stems of the plant. (See Plate V., fig. 5.).

The Dicranuras build very special "habitations" for their pupæ, the hardest and perhaps the best concealed of any that have come under my notice. *Dicranura vinula*, the largest species of the genus, makes an exceedingly tough cocoon, so hard that it is with difficulty that the point of a penknife can be made to penetrate it. In its construction a large portion of the larval "silk" appears to be deposited as a flaky material, in appearance not unlike thin sheet gelatine, interwoven with numerous strands of silken thread; the inside of the cocoon is brought to an even, smooth finish, but the outside is left somewhat uneven and has numerous pieces of the material on which it is constructed worked into it. Its most frequent position is on the trunk of the tree on which the larva has fed, and often the position chosen is in some depression in the bark, where, by reason of the pieces of the surrounding bark and the bits with which the larva decorates it, it becomes an object very difficult of detection. The cocoons of the other species are much the same in appearance, but it may be their somewhat smaller size or perhaps even greater care in the selection of position and construction that makes them even more effectually hidden. (See Plate IV., fig. 3, and Plate VI., fig. 3).

On one occasion I found a freshly emerged imago of *D. bifida* in my garden, at rest on a stake within a few inches of the stem of a poplar tree on which I felt convinced the larva had fed. On the assumption that "where there is one there is more," I at once made a careful search of the poplar trunk in the hope of finding further cocoons, but without result. In the course of a few days, however, I found another imago on almost the same spot, but it was not until the leaves were off the tree in the autumn, when consequently a brighter light fell on the trunk, that I found the empty cocoons, and probably I should not have detected them even then, so exactly did they match the surrounding parts of the trunk, except for the holes made in them by the emergence of the imagines.

D. bicuspis furnishes, if possible, an even better example of a cocoon protected by its resemblance to its surroundings, as anyone who has been fortunate enough to find it in its wild state will know full well. The larva feeds on alder and birch, but appears to be most frequently associated with the latter, and the much broken and often lichen-covered bark of the older trees affords splendid opportunities for the construction of well-concealed cocoons. *D. furcula*, feeding largely on willows and sallows, is in this respect at some disadvantage, often finding no better position for the construction of its cocoon than a slender branch; but even then it will frequently select a spot just below a fork in the branch, and so round off the ends of the cocoon, and touch up its surface with particles gnawed from the adjacent surface of the branch, as to make an inconspicuous object. (See Plate V., fig. 3.)

Although the bombyces furnish so many good examples of well protected and highly specialized cocoons, there are among the other macro groups many that are quite interesting. Of the former, *Bryophila muralis* is a good example. I once knew an old bridge wall where this species was very common, and wanting a good series thought I should have no difficulty in finding plenty of pupæ; but after searching carefully for perhaps half an hour and finding only two or three, I began to appreciate the ingenuity of the larva in concealing its cocoon, and found that however keen one's sight might be it was no match against the insect. The sense of touch, however, proved much more productive, and by carefully feeling along the likely crevices in the wall I secured some dozens of cocoons in quite a short space of time. Some of the Acronictas, as for example *Acronicta alni*, protect their pupæ by burrowing in rotten wood, or the soft pith of the branches of some tree, while others spin silken cocoons among rubbish, portions of which are woven in. *Plusia moneta* spins among the leaves of its foodplant, an egg-shaped silken cocoon superficially not unlike that of the silk-worm (*Bombyx mori*); while *Cucullia verbasci*, although pupating at some distance below the surface of the earth, constructs a cocoon of silk mixed with large quantities of soil, thus forming thick plaster walls of considerable toughness which it leaves rough and uneven on the outside. Although it is difficult to see any valid reason for this special construction in a subterranean cocoon, so long as it remains in its natural position; when dug up it may easily be passed over as a small clod of earth; but apart from its appearance, its toughness is an undoubted advantage to a species, which in common with other members of the genus which construct similar cocoons, often remains in pupa for more than one winter.

Among the Geometræ also there are some interesting examples; notably the beautiful hammock-like structure made by *Urapteryx sambucaria*, and the tight-fitting sack-like cocoon of *Pericallia syringaria*, so often finished off with a piece of dead leaf attached to one end, which materially assists in its concealment. Also, there is the cocoon of *Hemerophila abruptaria*, a spindle-shaped silken construction, usually placed at the junction of the branches of a small tree or shrub, finished off to exactly match the colour, and so placed as to give the idea of a thickening of the branch; as to be quite an inconspicuous object even when the trees are bare of leaves in winter. (See Plate V., fig. 4.)

Most of the larger sphinges, a few bombyces, and many of the Noctuæ and Geometræ pupate below the surface of the earth, but whether all of them can be said to construct a habitation for the pupa appears to be open to some doubt. Undoubtedly, in some cases, the subterranean habitation is of substantial construction, as in that of *C. verbasci* already mentioned; and if one carefully unearths the pupa of some other species, as for instance *Mamestra persicariæ*, it will be found to be enclosed in a very complete earthen cocoon, but of so frail a nature that it crumbles under very slight pressure. But in the case of some others, such as *Amphidasis betularia*, one may remove the overlying earth with the utmost care without being able to find the slightest trace of the cocoon. Yet, I think if one could induce these species that appear to have naked pupæ to make up in some visible position, we should find that the larva fashions an earthern cell for the pupa, although perhaps of such slight construction that any attempt to remove it would reduce it to powder.

The micro-lepidoptera provide many examples of highly specialized pupal habitations. Frequently their construction is commenced by the larva in its early life, and used by it during its growth as a protecting envelope, in some cases being adapted, on the larva becoming full-fed, for pupal purposes, while in others it appears to be used without further preparation. *Psyche villosella* is a good example. The larva constructs a silken case very early in its existence, and at once adorns it with fragments of whatever it may be feeding upon; as it grows it enlarges its case by spinning more silk and adding more fragments. Although it usually confines itself to pieces of its foodplant, it does not appear to be at all particular as to what substances it works in, as is well illustrated by an experiment carried out by the late Jenner Weir, which I have often heard him refer to with great gusto. Wishing to note exactly how the creature increased the size of the case when necessity caused it to do so, he placed among the heather on which he had a number of larvæ feeding, several little torn up pieces of the cover of the "Entomologist," and within a few days he found that the larvæ had added silk to the feeding end of the case, and had worked in with it several pieces of the paper along with bits of the heather, so that he had cases adorned with a brilliant orange fringe. When the larva is ready for pupation it attaches the feeding end of the case firmly to the stem of the foodplant, or some other solid object, turns round in the case, and spins a silken tube at what was originally its tail end. This tube closes the end of the case against attacks from the outside, but being elastic allows the pupa to protrude itself without difficulty when the moth is ready to come forth. The case of *Psyche opacella* is very similar, and when adorned with furze needles and attached to a furze bush, is almost impossible of detection, as may be seen by one of those exhibited.

Among the smaller phycids, which practically all make interesting cases, it will be sufficient to mention three examples. That of *Talaeporia tubulosa* (*pseudo-bombycella*), is a tough silken tube about three-quarters of an inch (18mm.) in length and some 2mm. only in diameter, dusted all over with minute fragments of lichen. Those of *Fumea crassiorella* and *Epichnopteryx reticella* are both adorned with pieces of grass stem of irregular lengths, placed lengthwise, giving them as uninsect-like an appearance as one can well imagine. (See Plate VII.)

Among the tortrices there is just one species to which I must refer.

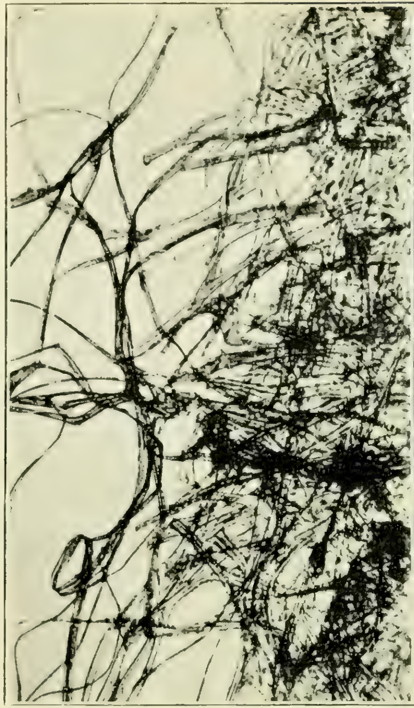
The larva of *Retinea resinella* appears to spend its earliest stages as a miner in the shoots of the Scots pine (*Pinus sylvestris*), but at some period, while still young, it taps the bark of the shoot, causing the resinous sap to flow. This, as it congeals, the larva fashions into a nodule about an inch in diameter, hollowing out the inside, possibly by feeding on the congealed sap. When about to pupate the larva spins a tube of soft tough silk from bottom to top of the nodule, the lower extremity resting on the inside of the bottom close to the shoot, while the top of the tube is just within the upper shell of the nodule at a short distance from the shoot, and the shell is here eaten away very thin. In this tube the larva turns to a pupa which, when the moth is about to emerge, thrusts itself through the wall of the nodule at the thinned spot, and the moth is thus enabled to escape. The position of the nodule is usually among the needles of the pine shoot, and it is of a very tough consistency ; the pupal tube, in its almost central position, within the tough walls of the nodule, is thus doubly well protected.

The coleophorids as a group are remarkable for their specialized pupal cases, some being constructed of silk, others of pieces of leaf-cuticle or it may be seed husk ; so diverse are these cases in form and general appearance that in the case of some of the closely allied species, in which the imagines are practically alike, they form an easy method of differentiation. In a group so numerous as the *Coleophora* it is manifestly impossible to even mention the peculiarities of all their pupal cases, but perhaps a couple of examples will be sufficient as an illustration of the general methods of construction. *Coleophora vibicella* commences its larval life as a miner in the leaves of *Genista tinctoria ;* after a while it comes out of the leaf and constructs a silken case, in shape, as Stainton aptly says, not unlike a nautilus shell, in which it wanders about on the plant to feed. As the larva grows it increases the size of its case by continuing what we may describe as the mouth of the nautilus shell in the form of a straight tube, until by the time the larva is full-fed the case is half an inch or more in length, and in shape somewhat like one of the old-fashioned horse pistols. The silk of which the case is composed is at first quite white, but gradually darkens, possibly being coloured by some substance secreted by the larva, until by the time the pupal change takes place it is practically black. It will thus be seen that apart from any benefit the coleophorid larva may derive, during its feeding time, from being furnished with a portable house, it in effect spends the greater part of its life in preparing a habitation for the pupa.

Coleophora lineolea also cemmences its larval life as an internal feeder, mining the leaves of black horehound (*Ballota nigra*), hedge woundwort (*Stachys sylvatica*) and some other plants. When it has mined a sufficiently large space, it cuts out the cuticles of the leaf and with them forms a case. Many of these leaf-case makers, unable to increase the size of their cases as necessity arises by adding to them, as do those whose cases are made of silk, discard their cases when they have outgrown them, re-enter a leaf, and having mined a sufficiently large space, construct a new and suitable case from the cuticles of the mined portion as before ; the last case made eventually becoming the habitation of the pupa. Some species appear to apply both principles in the construction of their cases, by making them of silk and adorning them with bitten off pieces of the foodplant. (See Plate VIII.)

As a last example of remarkable pupal habitations I would mention that of *Lyonetia clerckella*. This species spins a silken cocoon, and suspends it hammock-wise on a leaf of the foodplant by four silken guyropes at each end; and on the leaf, on either side of these supporting strands, it spins a loose, fine, silken web. It has been found that this web is of a very clinging nature and readily adheres to anything that may come in contact with it. It has recently been suggested that its function is to act as an entanglement to any marauding ant or other small enemy that may contemplate an attack upon the pupa.

Plate IV.



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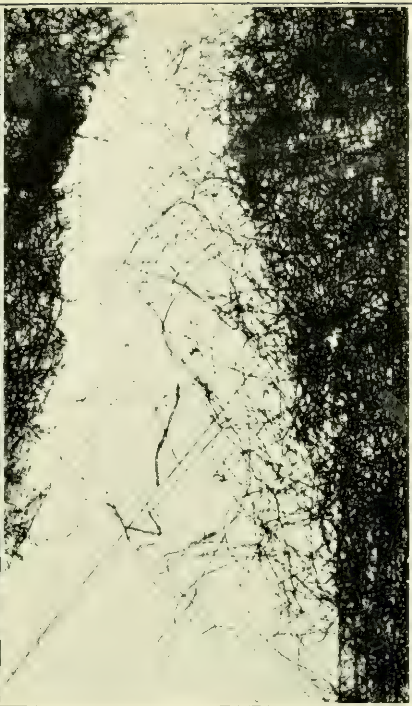

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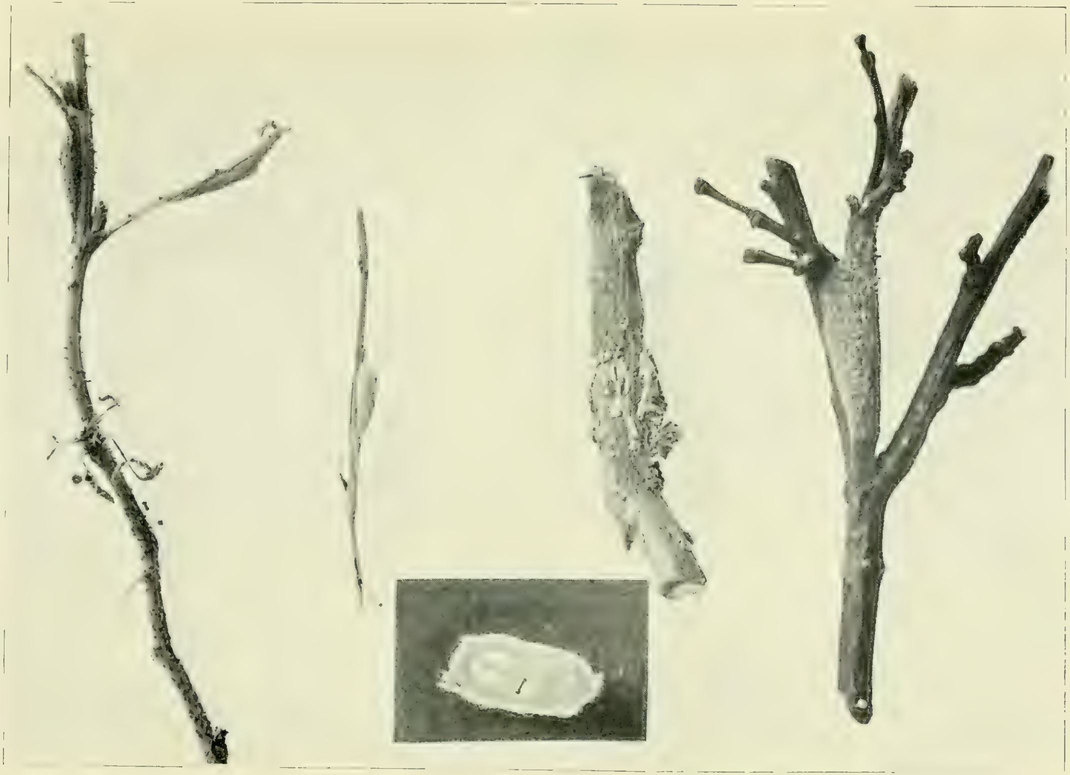
Photos by F. Noad Clark.



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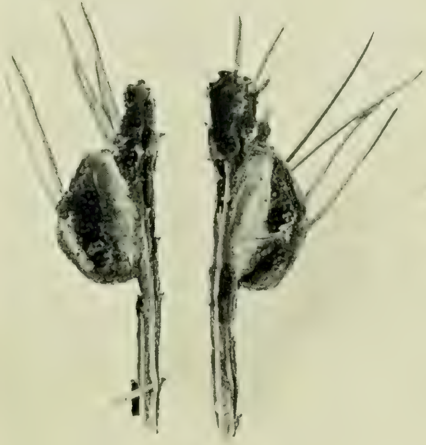

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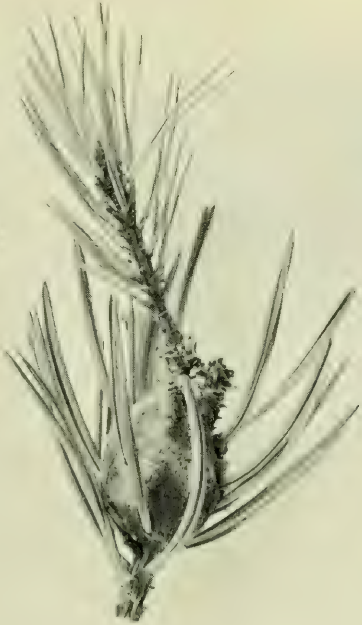

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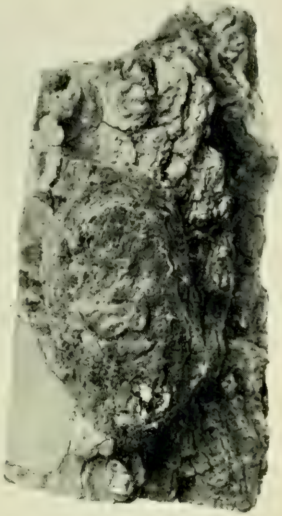

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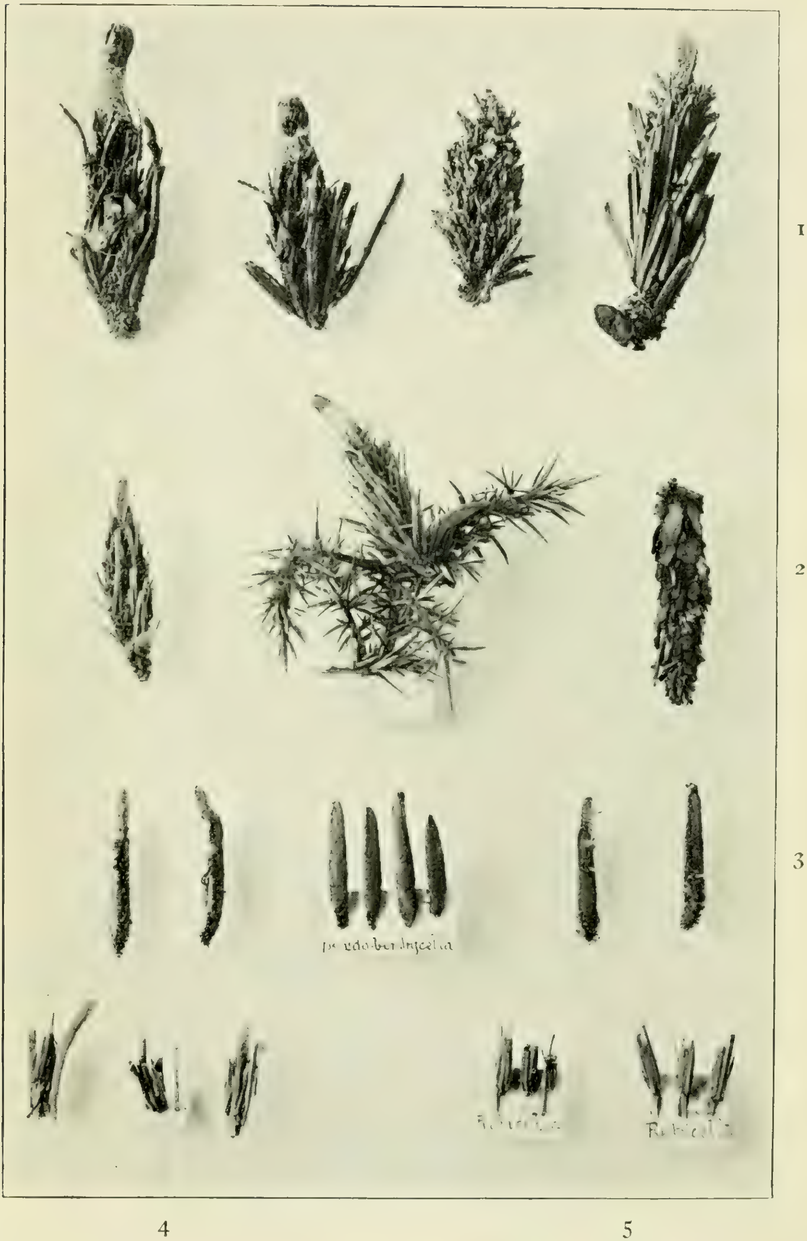
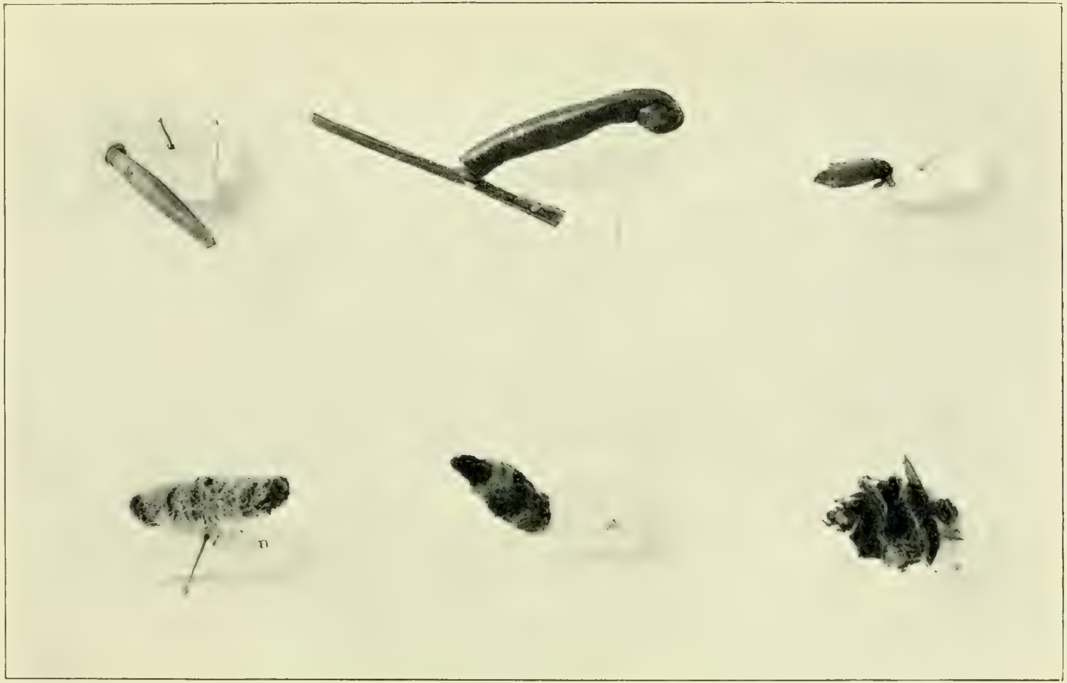
Photos by A. W. Dennis.



Photos by A. W. Dennis.

Plate VIII.



Photos by A. W. Dennis.

EXPLANATION OF PLATES.

Plate IV.

Portions of cocoons, showing the silken construction.

1. *Saturnia pavonia.*
2. *Anthrocera filipendulæ.*
3. *Dicranura vinula.*

All × 25.

Plate V.

1. Cocoons of *Nola albula* in sitû on raspberry cane.
2. Cocoon of *Nola centonalis* in sitû on dry grass stem.
3. Cocoon of *Dicranura furcula* in sitû on sallow branch.
4. Cocoon of *Hemerophila abruptaria* in sitû on branch of a tree.
5. Cocoon of *Lasiocampa ilicifolia.*

All slightly reduced.

Plate VI.

1. Nodule of *Retinea resinella* dissected to show silken pupal tube.
2. Nodule of *Retinea resinella* in sitû on pine shoot.
3. Cocoon of *Dicranura vinula* in sitû on tree bark.

All natural size.

Plate VII.

Psychid cases. All natural size.

1. *Psyche villosella.* The three on the left decorated with pieces of heather and the one on the right with fragments of pine needles.
2. *Psyche opacella.* The central specimen in sitû on a small branch of furze.
3. *Talæporia tubulosa* (*pseudo-bombycella*). The silken pupal tubes dusted with minute fragments of lichen, etc.
4. *Fumea crassiorella*, decorated with pieces of dry grass stem.
5. *Epichnopteryx reticella*, decorated with pieces of dry grass stem.

Plate VIII.

Coleophorid cases × 2.

1. *C. therinella.* An example of a straight silken case.
2. *C. vibicella.* An example of a pistol-shaped silken case.
3. *C. nigricella.* An example of a case formed from the cuticle of the leaf of the food-plant.
4. *C. onosmella.* A case formed of portions of the leaf of *Echium vulgare*, the nature of which gives the peculiar hairy appearance.
5. *C. lineolea.* Another example of a case formed from the cuticle of the leaf of the food-plant.
6. *C. saturatella.* A case formed of fragments of the leaves of the food-plant.

ANNUAL ADDRESS TO THE MEMBERS

OF THE

South London Entomological and Natural History Society.

By B. H. Smith, B.A., F.E.S.

Read January 28th, 1915.

GENTLEMEN,—I feel it my duty to make some apology and explanation for the meagreness and brevity of the Annual Address this year. For the past twelve months I have had the honour of being the President of your Society, an honour I appreciate very highly; but since the end of last July and the commencement of the war, other and graver matters have claimed the whole of my time and energies, so much so that it has been a matter of physical impossibility to prepare an address worthy of this Society and those given by my predecessors. The same reason must be my excuse for my frequent absences from our meetings during the autumn. I trust, therefore, that you will overlook my shortcomings, and will not put down to remissness and negligence what, I assure you, has been due simply and wholly to other obligations which have exhausted my whole time and energies. I may add that, as it is, I owe a great debt in the preparation of the present address to our indefatigable General Secretary, Mr. Stanley Edwards.

The council's report states that our membership stands at the satisfactory figure of one hundred and sixty-four; and though the activities of members in the entomological line are likely to be curtailed during the present year, I think the Society can look forward with confidence to a successful future. As an instance of how localities are barred to collectors, I may mention that I hear that the Isle of Portland is now inaccessible owing to military restrictions, and that the Chesil Beach on which I spent many enjoyable hours collecting last July is now a labyrinth of barbed wire entanglement. He would, too, be a bold entomologist who went about after dark with a bright lantern at the present time. There is but little doubt that owing to the spread of interest in the Study of Entomology during the last few years, there has been a strong tendency to over-collect the fauna native to the British Isles, and a period of cessation is more to be welcomed than deplored from the entomological point of view.

As already mentioned in the Report, we have lost one member by death, Mr. J. Alderson meeting a tragic end in a motor-car accident; and we also have to regret the inability to continue as the Society's lanternist of Mr. F. Noad Clarke, to whom the thanks of the Society have been due on so many occasions. Mr. Dennis, who has kindly consented to succeed him, will undoubtedly fill his post most successfully.

Of entomologists outside the Society who have passed away from us during the past twelve months, I regret to say that I have a long list to record.

The Rev. E. N. Bloomfield, who died on April 29th, at the ripe age of 87, was one of the most loveable and well known among British entomologists. He died at Guestling, near Hastings, which Rectory he had held for exactly fifty years. His chief hobby was the compilation of local catalogues, and while his acquaintance was chiefly with the lepidoptera, hymenoptera and diptera (which he contributed to the Flora and Fauna of Hastings, published in the seventies), it also comprised the coleoptera and hemiptera. The range of his knowledge extended to the mammals, birds, fishes, fungi, etc. His last work, which has not yet been published, was a compilation of the Diptera of Norfolk and Suffolk, while his last public appearance was at the Verrall Supper in 1913.

George Bentley Corbin, whose death took place at Ringwood, on March 12th, at the age of 73, was a keen and observant entomologist. He wrote the entomological chapter in Phillips' New Forest Handbook and contributed some articles on *Deiopeia pulchella* and *Emydia cribrum*, and "*Plusia moneta* in the New Forest," to the "Entomologist." The news of the tragic death of his wife, who was killed in a railway accident, caused partial paralysis of the left side, and, though he to some extent recovered, he remained an invalid for the remainder of his life.

H. T. Dobson died on June 27th, at New Malden, at the age of 61. He joined our Society in 1884, and was elected a member of the Entomological Society of London in 1895. Despite poor health and many calls on his time, he remained an enthusiastic lover of nature.

William Warren, M.A., F.E.S., died at Tring on October 18th, aged 75 years. His interest in British lepidoptera was life-long, and he was at work on his favourite study, Entomology, until within a few days of his death. As long ago as 1878 he contributed to the "Entomologists' Monthly Magazine" articles on the early stages of *Ephippiphora nigrocostana* and *Elachista stabilella*, and was the author of the race *impar* of *Bryophila muralis*. He was a voluminous describer of exotic Geometridæ and Pyralidæ, and during twenty years' work at Tring he contributed largely to that excellent work "Novitates Zoologicæ," describing geometrid fauna from India, New Guinea, and the basins of the Upper Aros, Anga Bunga and Bingi Rivers. Vol. 3 of Seitz's Work "The Macrolepidoptera of the World," dealing with the noctuids, is largely from his pen. His great forte was descriptive work.

William West, who died at Bradford in May, aged 66 years, was well known as botanist and biologist. Appointed botanical lecturer at Bradford Technical College in 1886, he succeeded in instilling the keenest enthusiasm in all his pupils. He was a recognised authority on Algæ, and a classification by him of the Desmidiaceæ was published by the Royal Society.

Dr. John H. Wood died at Ledbury, on August 29th, 1914, aged 73. His earlier studies were devoted to lepidoptera, when he worked out the life-histories of several species, including *Nepticula torminalis*, *Tiagma betulæ*, *Micropteryx sangii*, etc. Besides his discovery of *Ditula woodiana* and its larva, which feeds on mistletoe, he added several species of *Nepticula* to the British list. His later years he devoted with equal energy to the study of diptera, publishing a monograph on the difficult genus *Phora*. He contributed altogether 45 papers on Entomology between 1878 and last year.

The literature of Entomology has been no less prolific during the past year than it was in the previous twelve months, and it is impossible to enumerate anything like a complete list of the various publications of interest. I shall therefore only mention some of those that have come particularly before my notice.

"The Life of the Fly" and "The Life of the Spider," by J. H. Fabre are two delightful volumes from this inimitable observer, and are admirably translated by Mr. Alexander Teixeira de Mattos.

"Catalogue of the Lepidoptera Phalænæ of the British Museum," vol. xiii., by Sir G. T. Hampson, Bart., deals with the Noctuidæ. Altogether 79 genera and 679 species are classified, and of these 379 species in 44 genera are assigned to the Catocalinæ.

"Études de Lépidoptérologie Comparée," Fascicule ix., by Charles Oberthür; the last two parts; Part I. contains some 50 coloured plates of North American Butterflies, hand painted by M. J. Culot of Geneva; Part II. a résumé by Dr. Standfuss, of Zurich, of his breeding experiments with *Aglia tau*. There are also several interesting photographs of French, German, Swiss, and British Authorities, Britain being represented by that of Frederick Moore, D.Sc.

"Second Supplement to the Lepidoptera of the Isle of Purbeck," by N. M. Richardson, B.A., bringing up the total of species recorded for Purbeck to 1197, a remarkable number for so small a district. A copy of this work was presented to me by the author, from whom I received many kindnesses during my visit to Weymouth last July.

"The Genitalia of the Geometridæ," by Mr. F. N. Pierce with the assistance of the Rev. C. R. N. Burrows, is a most valuable help to a difficult study.

"A Revision of the Ichneumonidæ," by Claude Morley, F.E.S., based on the Collection in the British Museum. Part II. deals with 298 species belonging to the sub-families Pimplinæ and Ophioninæ.

"Type Species of the Genera of Ichneumon Flies," by H. L. Viereck. This catalogue deals with the Ichneumonidæ of the World, and though a large number of genera are monobasic, the labour involved in ascertaining the type of each of some two thousand genera is gigantic, and those who devote their time and ability to such a task deserve the warmest thanks of all entomologists.

Mr. C. L. Metcalf in his "Syrphidæ of Ohio," records many interesting facts about the larvæ of *Paragus* and *Syrphus*, etc. "Studies on the Mecoptera of Japan," by T. Miyaké, deserves the attention of every neuropterist. Besides six figures in the text, there are ten excellent plates.

"Common British Beetles," by the Rev. C. A. Hall, F.R.M.S., is a useful little work for the beginner, and I cordially trust that the author's hope that the volume will be the means of arousing a more general interest in beetles will be realized. "Entomology with special reference to its Biological and Economical Aspects," by J. W. Folsom, is a second edition of this valuable work.

"A Text book of Medical Entomology," by W. S. Patten, M.B., and F. W. Cragg, M.D., is a guide to the study of the relations between arthropods and disease, and supplies a vast amount of information useful to dwellers in tropical countries. Before concluding this short review of books published during last year, I must not fail to mention "A Monograph of the Genus *Teracolus*," by Emily Mary Bowdler Sharpe, with 44 excellent chromo-lithographic plates including 450 figures; the volume consists of eleven parts published between 1898 and 1905. It should prove of great use to the study of this difficult pierine genus.

Before drawing this short and incomplete summary of the past entomological year to a conclusion, I would place on record the names of those members who are now serving their country, and I should be glad, if the friends of some members who are now in His Majesty's forces find their names omitted, for them to communicate with me and also give me particulars of the forces they have joined, so that we may have as full a record as possible published in the Society's Proceedings.

Major Cardew is now in the Chief Requisition Office in the Expeditionary Force. An interesting letter from him lies on the table for those who would like to read it.

Major Fremlin, Lieut. Emmett, and Lieut. Stoneham have commissions also. The latter was invalided home, wounded. He wrote to the Hon. Secretary early this month from Reigate to say that he was progressing favourably.

H. W. Andrews, R. R. Armstrong, K. G. Blair, P. A. Buxton, T. H. L. Grosvenor, and N. D. Riley, are also doing their duty at the front, or are in training for being ordered abroad.

This list must necessarily be incomplete, and as I mentioned already I should esteem it a personal favour if members present can supply further details. Wherever duty calls those of us who have gone to take an active part in assisting England's arms in this crisis, they bear with them the best wishes of those members whose age and other duties have compelled them to remain behind, and are the subject of our earnest prayers for their safe and victorious return.

ABSTRACT OF PROCEEDINGS.

FEBRUARY 12*th*, 1914.

Mr. B. Harold Smith, B.A., F.E.S., *President*, in the chair.

Mr. B. Williams of East Finchley and Prof. Raphael Meldola, F.R.S., were elected members.

Mr. H. Rowland-Brown spoke at some length on the question of Nature Reserves, giving an account of what had been done so far, and what it was proposed to do in the future. He pointed out the extent of the financial obligations incurred for the regular upkeep of the areas already acquired, and asked for further financial aid to cover this, and for any suggestions as to the care and supervision of the reserves.

Rev. G. Wheeler read a paper, on "The Genus *Melitæa*." (see page 1), and exhibited numerous forms of many of the European species in illustration of his remarks.

Mr. A. E. Gibbs exhibited his collection of species and forms of the genus *Melitæa* from the Nearctic Region, including *M. phæton*, *M. chalcedon*, *M. macglashani*, *M. nubigena*, *M. editha*, *M. augusta*, *M. taylori*, *M. whitneyii*, *M. hoffmanni*, *M. gabbii*, *M. perse*, *M. harrisii*, *M. acastus*, *M. wrightii*, *M. minuta* and *M. sierra*, together with a number of species of the allied genus *Phyciodes* from North and Central America. He communicated the following notes:—

It is difficult to find any tangible points of separation between the two genera, and some authorities include most of the species of *Phyciodes* I am showing, with another genus, *Melitæa*. The only distinctive feature, so far as I can ascertain, is that the terminal joint of the palpi in *Phyciodes* is more attenuated. Dr. Seitz, in a recently published part of his great work, says that the groups "cannot be distinguished by any constant characteristics, even the most painstaking anatomical examination, nor even their biology revealing such." In the "Biologia" *Phyciodes* are separated into two groups, those having the outer margin of the wings rounded, and those having a sinuated margin. Most of the northern forms belong to the former group, but one notched-winged species, which I am showing—*Phyciodes texana*—extends as far north as Texas. I also exhibit some specimens belonging to the peculiar group in which the wings are of an almost unicolorous fulvous tint, *viz.*, *Phyciodes fragilis*, from South America, and its Central American representative, which has the sub-specific name of *guatamalina*.

Mr. B. S. Curwen exhibited short series of most of the European species of the genus *Melitæa*.

Mr. Stanley Edwards exhibited the following species of the genus *Phyciodes*: *P. amazonica*, *P. thymetus*, *P. lelex*, *P. texana*, and *P. lansdorfii*; also *Coatlantona narva* and *C. pœcile* from South and Central America.

Mr. J. Platt Barrett exhibited series of *Melitæa athalia* and *M. didyma* from Sicily.

Mr. Newman remarked that in breeding *M. aurinia*, from Carlisle, he had as many as 90% of his larvæ produce ichneumons, and quite 70 or 80% from Irish larvæ had done so.

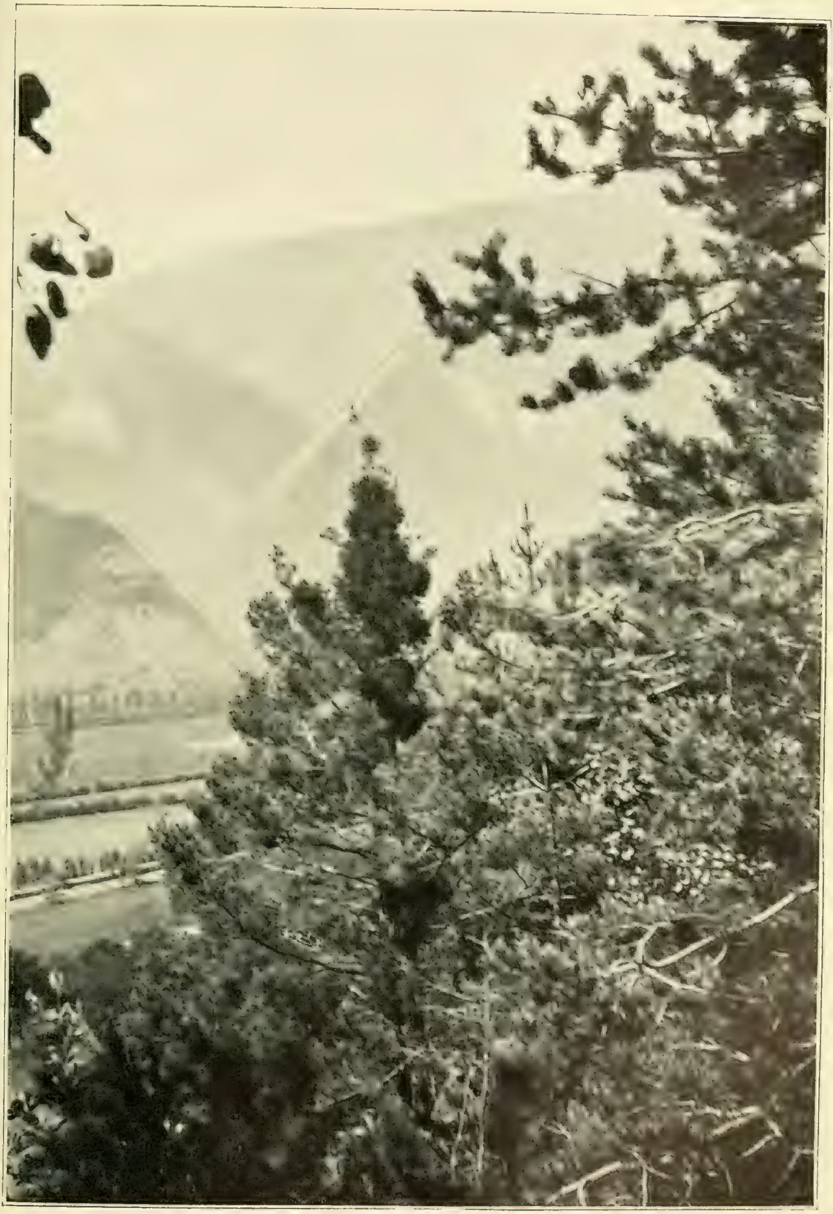
Mr. Rowland-Brown's experience in breeding *M. aurinia* agreed with Mr. Newman's, and he had found the larvæ of *M. didyma* also extensively ichneumoned. He called attention to the fact that many specimens of *Melitæa* from the Isére district of the French Alps, were very light in colour, while in the Samoussy district East of Paris very dark suffused forms were more prevalent.

FEBRUARY 26th, 1914.

The feature of the evening was a special Exhibition of Lantern Slides.

Dr. T. A. Chapman exhibited four photographs of mistletoe on Scots pine, taken at Bourg d'Oisans, in the Dauphiny Alps, and communicated the following notes:—"Mistletoe grows especially on apple; this is markedly the case in England, as in Herefordshire, where it is very abundant and supports the beautiful tortrix, *Ditula woodiana*, Barr., and the hemipteron, *Anthocoris visci*, Dug., neither found elsewhere. In the plains of France, as may be well seen in travelling to Paris, it is most abundant on poplar, as also in our South-eastern counties. Doubtless, because these (apple and poplar) are, in each case, the most abundant of the trees it affects. In the lower Alpine regions, and elsewhere, it is most

Pinus sylvestris at Bourg d' Oisans
with mistletoe on main stems.



PINUS SYLVESTRIS AT BOURG D' OISANS.
WITH MISTLETOE ON MAIN STEMS.

common on Scots pine, as in the Rhine valley, Dauphiny, etc. This is remarkable in so far as that, amongst the forty or fifty species of trees and shrubs on which it grows in England, Scots pine has never been recorded. The plants of mistletoe are usually scattered irregularly over its host, and this is also the case as regards the Scots pine, but I noticed at Bourg d'Oisans that, in no small proportion of cases, it was crowded on the upper six, ten or more feet of the leading shoot, so as more or less completely to smother it. The photographs illustrate this curious distribution. How this occurs is open to discussion; most probably it has some reference to the perching habits of the birds that happen to be its chief disseminators. (See Plates IX. and X.)

Mr. A. E. Tonge exhibited slides illustrating the burrows of *Ægeria andrenæformis*, a wild, newly-emerged *A. formicæformis* and its projecting pupa case, a mass of ova of *Orgyia antiqua* on sea-buckthorn, a web of *Eriogaster lanestris* on sloe, the ova of *Nonagria neurica* on the inside of a sheath of reed-stem, a batch of the ova of *Tæniocampa gothica* on a head of bramble, a cocoon of the micro-lepidopteron, *Lyonetia clerckella*, and of the ova of several species of Lepidoptera, *in situ*, wild laid.

Mr. C. B. Williams exhibited slides illustrating the oothecæ of *Mantis bioculata*, a mass of micro-organisms obtained by the use of the Berlese apparatus, the egg of the snake-fly (*Rhaphidia maculicollis*), several species of *Coniopteryx* and a species of Aleurodidæ.

Mr. West (of Ashtead) exhibited slides illustrating various species of springtails (Collembola), the crustacean which inhabits ants-nests (*Platyarthrus hofmannseggii*), ova of *Phylloxera punctata*, several species of freshwater Rotifera and Entomostraca, and examples of Mycetozoa.

Mr. Dennis exhibited slides illustrating galls on willow catkins and leaves, lime (an unnamed species of Diptera), ash, aspen, dropwort, plantain, honeysuckle (aphis), fir (aphis), alder (mite), walnut, oak (spangles), etc.

Mr. Colthrup exhibited a long series of slides illustrating the resting positions of numerous species of Lepidoptera, including *Boarmia gemmaria* (*rhomboidaria*), *Pachetra leucophæa*, *Colias edusa*, *Anticlea badiata*, *Cuspidia megacephala*, *Pieris brassicæ*, *Dianthœcia carpophaga* (pale form from Eastbourne), *Anticlea nigrofasciara* (*derivata*), *Lobophora carpinata* (*lobulata*), *Mania typica*, *Abraxas grossulariata*, *Eremobia ochroleuca*, *Agriades thetis*, etc. He afterwards showed slides of the nests and nesting sites of the ringed plover, the Norfolk plover, and several terns, and read a note on the nesting habits of the species and his experience of the difficulties of obtaining records of them with the camera. (See page 17.)

Mr. F. W. Frohawk exhibited a selection of a series of *Anosia plexippus* bred by him from ova in this country. This was the first recorded breeding of the species in Europe. He received a living female on August 8th, 1911, from Mr. Gerould, of Hanover, N.A., and eggs were laid on that day. In about 90 hours they commenced to hatch. The larval stage lasted 16 days, and the pupal stage 15 days. Thus the total time taken from ovum to imago was between 34 and 35 days. One male bred was very large, measuring $4\frac{5}{8}$in. = 115mm. Mr. Frohawk recounted the instances of this species being captured in this country, some 24 in number, from the year 1876.

Mr. Hugh Main exhibited larvæ of a species of longicorn (Coleoptera), *Nacerdes melanura* (Œdemeridæ), obtained from logs of timber lying on or in the ground. He also showed a very fine gynandromorphic example of *Eriogaster lanestris*, bred by Mr. E. P. Sharp, of Eastbourne. The left wings and antenna were male, and the right wings and antenna female. The abdomen was like that of a female, but the genitalia had not yet been examined.

Mr. Edwards exhibited a fossil shark's tooth, *Carcharodon megaloda*, from Mexico, and contributed the following note:—

"The interesting genus *Carcharodon* has one extinct species in the Cretaceous, and several others distributed in Tertiary formations in nearly every part of the world. The teeth of some of the Tertiary species measure five inches along the margin and four inches across the base, and it is evident that they belonged to sharks so gigantic as completely to dwarf the existing species. That these giant *Lamnidæ* have only recently become extinct, is proved by the fact that similar teeth have been dredged from the bottom of the Pacific. *Carcharodon rondeletii*, found from the Mediterranean to Australia and New Zealand, is said to grow to a length of 40 feet."

Mr. W. J. Kaye exhibited two plants of the beautiful South American orchid, *Sophronitis grandiflora*, and called attention to the intense coloration of the flowers on one of the plants. He also showed specimens of the syntomid, *Diptilon hallerate* from South America, in which the secondaries were so shaped and rolled towards the abdomen as to give the moth the appearance of a dipteron.

MARCH 12th, 1914.

Mr. J. C. F. Fryer, of Craven House, Northumberland Avenue, was elected a member.

Mr. W. J. Kaye exhibited two extremely similar species of the genus *Heliconius*, *H. amaryllis* form *euryades* and *H. hydara*, uniformly black insects with a large red fascia on the forewings. Under the microscope he showed that the genitalia of the two species were quite distinct.

Mr. Newman exhibited a female specimen of *Gastropacha ilicifolia* taken at Cannock Chase on May 25th, 1913, by G. B. Oliver, from which he had obtained ova. He was anxiously awaiting the result of their hatching and development.

Mr. A. E. Tonge exhibited a nest of the bald-faced hornet, *Vespa maculata*, an American species of social wasp, from Webster, Mass., taken in April, 1913. Four specimens of the maker were included in the exhibit. The nest had been suspended in a doorway.

Dr. Chapman reported that he had had a number of syrphid larvæ alive throughout the winter, and had fed them on aphids. Already several of the imagines had emerged.

Mr. E. Step exhibited four photographs of *Aleurodes* showing the egg cluster, nymphs and imago of *A. rubi*, (?) with one-spotted wings, on bramble; and the imago of *A. brassicæ* with two-spotted wings. All from his garden at Ashtead. He thought that the Aleurodidæ must be the most utterly neglected family of all the British Insecta. In this country J. W. Douglas appeared to be the only entomologist of the past who had paid any attention to them, and his numerous brief notes in the "Ent. Mo. Mag." constituted our principal literature on the subject. More recently Maskell had monographed them in the "Transactions of the New Zealand Institute," but had merely included the names of the British species, his descriptions and figures having reference to the New Zealand species. Douglas led one to believe that these Insects were only in evidence from early summer to late autumn, which may have been due to his observations being restricted to these seasons. The photographs exhibited were taken from living material in January and February of the present year, which showed their activities were not restricted to any season. The moth-like appearance of the imago is due to the wings being coated with a meal-like powder, much of which is shaken off by the female, possibly to prepare an area on the undersurface of the leaf upon which she intends to deposit her eggs. This use looks as though the powder might have some protective value.

Mr. C. B. Williams said that the powder was a waxy secretion of the body, which fell on the wings and was always coming off. As to its utility, he could only note that other insects such as *Coniopteryx* were quite helpless when placed in it. He stated that the *Aleurodes* were frequently parthenogenetic.

The rest of the evening was given up to the exhibition of objects under the microscope.

Dr. Chapman exhibited the androconia of *Agriades thersites*. He said that there were two different forms of androconia, the smaller one peculiar to the second or summer brood, the larger found in the first or spring emergence and also in the single brooded race of the species. He noted that the androconia of the spring brood had a close resemblance to those of *Polyommatus escheri*, while those of the summer-emerged form were very similar to the androconia of *Polyommatus icarus*.

Mr. West (Ashtead) exhibited imagines of the beautiful *Aleurodes* species previously referred to by Mr. Step.

Mr. R. Adkin showed lepidopterous subjects, including the anal appendages of *Ptycholoma lecheana*, exhibiting the beautiful hair-like structures proceeding from their extremity; also portions of the cocoons of *Anthrocera filipendulæ* and *Saturnia pavonia*, demonstrating the silken-thread structure of the apparently parchment-like substance of which they are constructed.

Mr. C. B. Williams exhibited British species of the order Protura in which the antennæ are completely wanting or extremely minute.

Mr. Coxhead showed the gall of *Cecidomyia saliciperda*, Duff., on willow, from Loughton, together with sections showing both larvæ and pupæ *in sitû*.

Mr. Ashdown exhibited various species of Coleoptera and Hemiptera, including *Ceuthorrhynchidius horridus*, larva of *Jalla dumosa* (British), etc.; and the Swiss *Hispa atra*.

Mr. F. Noad Clarke exhibited androconial scales of *Pieris brassicæ*, the diatom, *Arachnoidiscus ehrenbergii*, the desmids, *Micrasterias*, *Penium* and *Cosmarium*; leaf of the sago palm, *Cycas revoluta*, showing stomata, and the stellate hairs of the leaf of the water lily, *Castalia alba*.

Dr. Chapman showed androconia (battle-dore scales) of *Agriades thersites*, demonstrating that in this species they are seasonally dimorphic. In the spring emergence (and when single-brooded) the scales closely resemble those of *P. escheri*, but in the summer brood are much smaller and resemble those of *Polyommatus icarus*, being in size at least less like those of *P. escheri* than those of *P. icarus* are.

MARCH 26*th*, 1914.

Mr. Stanley Edwards exhibited the large coleopteron *Archon centaurus*, found dead in a garden at Blackheath. It was a native of West Africa, and there seemed no information as to how it got into the garden.

He also exhibited the following butterflies from Burmah:—*Abisara neaphron*, *Mycalesis lepcha*, and *M. nicotia*, with the beautiful chalcosiids, *Chalcosia venosa* and *C. zetica* from the same country.

Mr. A. E. Tonge exhibited a long series of *Colias edusa* of both sexes, including four of the female var. *helice*, taken in the Reigate district in the years 1877-8, when the species was so exceptionally abundant over a large area of the British Islands, by Mr. Edwin Ashby of Redhill. They had been lent by the Holmesdale Natural History Society, in whose collection they were. There was very little variation in the series.

Mr. Hy. J. Turner exhibited a short series of *C. edusa* from various localities in England, including female var. *helice* from Dawlish, and bred specimens intermediate in general coloration between the typical form and the var. *helice*.

Mr. A. E. Gibbs exhibited *Colias edusa* from England, Vosges Mts., Pyrenees, Alpes Maritimes, Corsica, Central Spain (with var. *pyrenaica*), Central Italy, Sicily, Montenegro, Herzegovina, Bosnia and Algeria; *Colias fieldii*, from Central Asia; *C. aurora*, from the Altai Mts.; *C. aurorina* var. *heldreichii*, from Greece; and *C. romanovi*, from Turkestan. He also showed the American species *C. eurytheme* gen. hiem. *keewaydin*, and *Lesbia pyrrhothea*.

Mr. R. Adkin exhibited a large number of examples of *C. edusa* from the British Isles, many of them from the West of England, and including numerous specimens of coloration intermediate between the type and var. *helice*.

Mr. Joy exhibited a large number of bred specimens of *Colias edusa*, all large in size and including females with very small or no blotches in the marginal bands of the forewings.

Mr. Dunster exhibited specimens of *Colias edusa*, taken during the past three years along the South Coast of England.

Mr. F. W. Frohawk exhibited a series of 55 *Colias edusa* and female var. *helice*, varying in colour from almost pure white to rich orange, showing a complete gradation of intermediate coloration, including very rare shades of clear lemon-yellow and bright lemon-yellow. Of var. *helice* some had very large pale patches replacing the black colour and gradations of underside coloration. A second series of 57 specimens varying from lemon-yellow to deep orange was also shown with the striking aberrations; 1. With black suffusion from the apex to the discoidal spot; 2. A lemon-yellow specimen with black hindwing; 3. A female with drab marginal borders and a complete row of inter-nervule lemon-yellow spots; and 4. A large female measuring 67mm. in expanse.

Mr. Robert Adkin read a paper entitled "*Colias edusa* in Britain," and illustrated his remarks by a large scale map of Western Europe and the British Islands, and a long series of *C. edusa* which included many of the forms to which he referred. (See page 17.)

In the discussion which followed, Mr. A. Sich said too much reliance should not be placed on Moufett's work, as a great deal of it was taken from Gesner, the great Swiss writer, and might not apply to British insects. The form of *helice* was a sex-limited variation, but there was an idea that a specimen had been taken, showing the wings of a normal male on one side and those of *helice* on the other. If *C. edusa* followed the lines of migration suggested, it might account for its comparative scarceness in Germany, where *C. hyale* was the commoner species of the two. *C. edusa* was not the only butterfly which would die out in the British Isles but for migration. *Pieris brassicæ* could pass the English winter in the pupa stage, but would die out if there were a series of hard winters and no immigration.

Mr. J. Platt Barrett said he had taken a great deal of interest in the species ever since he came to London in 1858, in which year he captured his first specimen at Riddlesdown. He resided for many years in Margate, and he thought he was right in saying that in no part of England was clover, lucerne, and sainfoin grown more commonly than in that neighbourhood, nor was *C. edusa* met with more frequently in any part than there, and he had met with it or heard of it being taken practically every year while he was there, and he had come to regard it as a yearly immigrant. He regarded Sicily, where he had been a frequent visitor, as one of the homes of *C. edusa*. There throughout the winter, on sunny days, specimens could be met with quite commonly; the first emergence was in May, and was followed by brood upon brood throughout the year. He considered the species was common in the North of

France, having seen it near Boulogne amongst sainfoin, and being a strong flier it would, on a fine day and with a favourable breeze, easily cross the channel to Britain. He considered that Fabricius' name, *edusa*, should be retained for our "Clouded Yellow" butterfly.

The President (Mr. B. H. Smith) said that during his four years residence at Warlingham, Surrey, he had met with *C. edusa* each year in greater or lesser numbers, except in 1910, in which year not only had he failed to find it, but a friend who was not under the disadvantage of having to be in London during the day, and who had kept a careful record, had not met with a single specimen in that year. He thought it might reasonably be concluded that it was absent from the Warlingham district in 1910. In 1912 he had seen the species on the wing in some numbers as late as October 16th at Sidmouth. In regard to rearing the species, he said that a female which he took on September 15th, 1911, deposited ova sparingly on sprigs of red clover on the 17th, but during several stormy sunless days that followed none were laid. The weather improved on 22nd, and on the female being placed in the sunshine she deposited freely on the leaves, and occasionally on the stalks of the clover during the succeeding days, which were very sunny. The eggs hatched out between October 10th and 15th, and the larvæ passed the 1st, 2nd, and 3rd instars successfully in a greenhouse, when the temperature was never allowed to fall below 40 degrees; but in January there was a heavy mortality, possibly on account of the supply of lucerne, on which up to that time they had been fed, running out and clover being substituted for it. Of those remaining, some half dozen only reached the pupal stage, and only three imagines emerged.

Mr. L. W. Newman, referring to the migration of *C. edusa*, said that he was able to fix the date as Whit-Sunday or Whit-Monday, 1892, on which he witnessed in a field at Singleton, near Goodwood, enormous numbers of the species, including a fair percentage of var. *helice*, and had no doubt that he had beheld the arrival of a migratory swarm. On the following day not one was to be seen in the field, the swarm having evidently passed on, and the individuals dispersed themselves over the country. With regard to *P. brassica*, he could not agree with Mr. Sich's suggestion that a series of hard winters would be fatal to the pupæ. He instanced his treatment of about a hundred pupæ which he had kept in a heated room from November to January with a view to forcing the emergence of the imagines. As none came out, he exposed the pupæ to sharp frost, placing them in a shallow tin on a grass lawn, and then returned them to the warm room. Later in the month he repeated this treatment, but only three of the pupæ appeared to be killed by the process, nor did the time of emergence appear to be affected by it, as the imagines came forth at the same time as others kept under normal conditions, and their colour and markings also appeared to be unaffected.

Mr. F. W. Frohawk said that after many years careful study of the species he was strongly of the opinion that *C. edusa* may occasionally survive the winter in the most sheltered spots in Devon and Cornwall, provided there is no frost or continued damp and cold, as either are fatal to the larvæ. He had no doubt that, given fine weather, *C. edusa* deposits ova very freely directly after reaching our shores in the spring, the normal time being, for their first appearance, the end of May or early in June; these under favourable conditions produce imagines in August, and a succession of broods is the result.

APRIL 9*th*, 1914.

Mr. R. Adkin, F.E.S., *in the Chair.*

Mr. R. Adkin exhibited three specimens of *Dasychira fascelina*, in one of which the usual black transverse lines were to a great extent replaced by yellow, and in another the usual yellow freckling was absent and the black markings somewhat intensified. Both these specimens are figured in Barrett's "Lepidoptera of the British Isles." The third specimen was similar to the second, but the black markings, were less strongly produced.

Mr. Stanley Edwards exhibited a number of conspicuously marked Heterocera from Burmah, including *Argina argus*, a very beautiful lithosiid, *Euchromia formosa*, a very strikingly marked species of a group allied to what we commonly call zygænids, *Heterusia* (*Devanica*) *edocla*, a species of Chalcosiidæ, one of the most brilliantly marked of the exotic families of moths, *Crishna* (*Petula*) *macrops*, a huge species of the Noctuidæ remarkable for the extreme development of tibial tufts, and *Abraxaphantes perampta*, a large geometer allied to the British *Abraxas sylvata* (*ulmata*).

Mr. Alfred Sich exhibited specimens of *Lita leucomelanella*, Zeller, from near Weymouth, first described by Zeller in 1839, and taken in England by Boyd in 1858, who found the larva in the shoots of *Silene maritima.* This species may be distinguished from its near allies by its black and white markings and want of any ferruginous tint.

Mr. Hy. J. Turner exhibited a long series of *Erebia pronoë* from the Austrian Tyrol and from Switzerland; and contributed the following note:—

"Although I have had a series of this species for some years, and have collected in various parts of the Alps, it was not until the summer of last year that I met with *Erebia pronoë* alive in its native haunts. In early August, 1913, I spent some days in the Dolomites and there met with the species in number, and a few days later it was found in considerable abundance at Tre Croci in the neighbourhood of Cortina.

Esper was the first to describe this species in his "Schmetterlinge in Abbildungen nach der Natur," in the year 1780, and to figure it under the name *Papilio Nymphales gemmati pronoë*, on Plate 54.

Erebia pronoë is a well distributed species, occurring over the whole of the Alps—French, Swiss, and Austrian—the Pyrenees, the Apennines, the Carpathians, S.-W. Russia, and the southern slopes of the Caucasus, frequenting moist meadow land and grassy slopes of the mountain and alpine regions up to some 8,000ft., flying in a somewhat undecided and irregular manner not far from the scattered trees at the borders of the more wooded areas.

As will be seen from the series exhibited, there is a considerable amount of variation, ranging from the banded specimens with eye-spots to specimens devoid of either band or eye-spots, although there seems a convergence of forms around these two extremes. In fact, these two forms are more or less a matter of locality. The banded form, that described by Esper under the name *pronoë*, is the dominant form over the Austrian Alps, the French Alps, and the Pyrenees; while the form, characterized by uniformity of coloration, and named *pitho* by Hubner, is dominant in the Swiss Alps. This is not exclusively so, but *pitho* may be termed racial in the Swiss Alps, whilst elsewhere it occurs only as an aberration or *vice-versa.* In the Bavarian Alps, a form with rust-red bands on the forewings and white pupilled eye-spots has been named *subalpina* by Gumppenberg in the "Stettiner Ent. Zeit." Staudinger has named a small form which he obtained in the Pyrenees as *pyrenaica*, and a form in which all the eye-spots are without white pupils he calls *almangoviæ.*

The direction of variation may be summed up as follows:—

1. The number, presence or absence, and development of the eye-spots.
2. The development and depth of colour of the rust-red areas on the fore- and hindwings.
3. The general character of the ground colour and mottling of the bands of the hindwings on the under-surface.

My series of captures of 1913 seemed, on the whole, to be larger insects than any of those series which I previously possessed, a large specimen among the latter being only exceptional."

Mr. W. West (Greenwich) exhibited three drawers from the Society's collection of British Lepidoptera, comprising Pyrales and Tortrices to show the additions made through the kindness of Mr. Dawson.

Mr. J. Platt-Barrett exhibited a series of *Coccyx strobilella* bred from cones of spruce picked up at W. Wickham some weeks ago, and also a cone showing the pupa case. He reported having seen *Celastrina argiolus* on April 1st in a tram-car in S.E. London.

APRIL 23*rd*, 1914.

A Special Exhibition of Orders other than Lepidoptera.

Mr. C. W. Colthrup exhibited a large collection of British land shells collected by him, mainly in Surrey, Kent, and Sussex.

Mr. Stanley Edwards exhibited the following large and conspicuous species of exotic coleoptera:—*Golofa porteri*, Columbia; *Sagra buquettii*, S. America; *S. splendida*, Burmah; *S. femorata*, Burmah; *S. rugosipennis*, Burmah; *Chrysochroa vittata*, Burmah; *Euchroma gigantea*, S. America; *Lamprina aurata*, Australia; *Cassida sexpustulata*, Brazil; *Entimus nobilis*, Brazil; *Sternocera orientalis*, Burmah; *Chrysodema aurofoveata*, Burmah; *Trachyderes succinctus*, S. America; *Chlorida festiva*, S. America; and *Purpuricennes sanguinolentus*, S. America (?). He also showed many species of exotic hymenoptera.

Mr. Ashdown exhibited a collection of Swiss coleoptera, including more than forty species of Longicornia, also *Mycetina cruciata*, *Eros aurora*, *Pyropterus affinis*, *Emus hirtus* (a pair), and many species of Phytophaga.

Mr. A. E. Gibbs exhibited insects received from British Honduras with the collections of butterflies and moths which had been sent him from that colony. There were included two large lantern-flies, probably *Fulgora lanternaria*. These huge homoptera are said by some writers to be luminous, whence their name, but this statement is doubted, and not now generally accepted. Another homopteron was very leaf-like. There was a mole-cricket, reminding one of our British species, and a very large black wasp. A considerable discussion took place on luminous insects.

Mr. Step exhibited male and female examples of the so-called hornet fly (*Asilus crabroniformis*), and remarked upon the rapacious habits of the species, which hawks after other insects, often larger than itself, or protected by stings, dragonflies, tiger-beetles, and wasps having been recorded as falling victims to its stiletto-like beak. He also showed examples of *Tachina grossa* and *T. fera*, hairy flies which in the larval state attack the larvæ of lepidoptera and coleoptera.

On behalf of Mr. West (of Ashtead) he brought up two photos of dipterous pupæ which Mr. Step thought to be a species of *Ceratopogon*. The insects had been found by Mr. West under the bark of a dead pine on Box Hill. The photos were on a scale of × 9 and × 20, and showed that the insects, after pupating within the larva-skin, wriggled almost out by means of their spines, so that the shrivelled larva-skin appeared like a long tail.

Mr. W. West (Greenwich) exhibited (1) 13 cabinet drawers of the Society's reference collections, 6 Coleoptera, 2 Orthoptera, 2 Neuroptera, 1 Hymenoptera, and 2 Hemiptera, including many recent additions; (2) a box of types of Diptera presented to the Society by Mr. Andrews; and (3) his own collection of British Homoptera.

Mr. C. B. Williams exhibited some adults of the beetle *Lochmæa suturalis* feeding on heather, from Cheshire; a willow stem damaged by *Cecidomyia saliciperda*, showing empty pupa cases projecting from larval bores, from Wimbledon, Surrey.

Mr. A. Sich exhibited a series of coloured drawings of slugs, and referred to the variation and habits of the different species. Among them were *Arion hortensis*, *Agriolimax agrestis*, *Limax tenellus*, *Limax flavus*, and *Limax marginatus*.

Mr. Andrews exhibited the following rare diptera, and contributed notes on them:—*Lispe pigmæa*, Fall., *Limnophora æstuum*, Vill., both from Porthcawl, July, 1913; *Fannia ciliata*, Stein., Milford Haven, June, 1913; *Phorbia parva*, Ztt., Chattenden, March, 1912; *Chirosia parvicornis*, Ztt., North Kent, June 1910 and 1912; and *Macronychia griseola*, Fall. (*viatica*, Mg.), Porthcawl, June 27th, 1913.

Lispe pygmæa and *Chirosia parvicornis*, are included in the late Mr. Verrall's list of "Another 100 new species of Diptera," "Ent. Mo. Mag.," April, 1911.

Phorbia parva, Ztt., an early spring species taken at Sallows; not yet in any printed list, probably common if looked for.

Limnophora æstuum, Vill., not yet in any printed list, but taken by him in Ireland as well as at Porthcawl. There was one doubtful female of this species in the late Mr. Verrall's collection.

Fannia ciliata, Stein. One male is recorded in the "Scottish Naturalist" for July 1912, as being taken by Mr. King at Forres. The female was unknown, but the female specimen exhibited was taken at the same time and place as the two males.

Macronychia griseola, Fall. Identified by Mr. Wainwright, who informs me he only knows of one other British record—by Col. Yerbury from the same locality (Porthcawl).

Mr. Robert Adkin brought for exhibition a copy of the volume of Rösel's "Der Natuurlyke Historie der Insecten," dealing with the Orthoptera, and called attention to the beautiful execution of many of the plates, the work having been published in Amsterdam during the years 1764 to 1768.

Mr. R. Armstrong Adkin exhibited series of shells of the water snail *Limnæa peregra* from various ponds and streams in the adjacent counties, to show the great variation obtaining in both size and colour even in waters of the same district.

Mr. Dennis exhibited a large number of photographs of plant-galls.

Mr. E. E. Green exhibited (1) a series of miscellaneous Coccidæ, (2) microscope slides of Coccidæ, (3) some drawings of Ceylon Coccidæ, being a portion of the illustrations for his projected work "The Coccidæ of Ceylon."

Mr. Edwards exhibited living larvæ of *Tipula oleracea*, which had been found in some numbers on a path, probably driven out of the ground by the waterlogged state of the soil. He also showed living larvæ of the stag-beetle, *Lucanus cervus*.

Mr. B. W. Adkin exhibited larch bark with extensive gall patches caused by the homopteron *Chermes corticalis*. The specimens were from Cumberland, where the insect was doing considerable damage to plantations. He also showed examples of the damage done to the Weymouth pine in South Wales by the attacks of an allied species, *Chermes viridis*; and stated that in the latter area a large number of trees had been totally destroyed by the attacks of the coleopteron *Hylobius abietis*.

Mr. H. Moore exhibited a beetle, *Geotrupes stercorarius*, which had been infested with mites and from which no fewer than 925 individuals of a *Gamasus* sp.? had been taken.

A considerable discussion took place.

MAY 14*th*, 1914.

Mr. C. B. Williams read a paper on "The Thysanoptera," and showed a series of lantern slides in illustration of his remarks, together with a number of specimens exhibited under microscopes.

Mr. C. Hocking exhibited branches of the common furze, *Ulex europaeus*, taken from Danbury Common, Essex, which had been killed by the close web with which they were covered. The web had been made by countless numbers of an extremely small mite, said to be *Tetranychus lintearius*, which were still present. The web was closely woven of very fine filaments, of a whitish colour when fresh, but quickly becoming brownish-white. A large area on the common was affected by this acarid, the gorse being completely killed wherever it was attacked.

Mr. Step said that he had met with webs of an allied species, *Tetranychus tiliarum*, on the trunk of a lime tree at Mickleham, where it had been sufficiently profuse to attract the attention of a cowman, who had asked him to go and look at the tree.

Mr. B. W. Adkin exhibited several aberrations of *Colias edusa*. In one, a male, the outer margin was extremely pale, apparently with very few black scales, most of the scales being of the ordinary rich yellow, a combination which gave a most curious appearance. Another specimen was about half the usual size. One example of var. *helice* instead of being white was decidedly yellowish.

Messrs. Blair, Edwards, Moore and Main exhibited various species of luminous and reputed luminous insects, including *Photinus pyralis*, *Lamprorhiza splendidula*, *Lampyris noctiluca*, *Photinus pennsylvanus*, *Fulgora lanternaria*, *Fulgora candelaria*, *Zanna terminalis*, *Pyrops cultellata*, *Hotinus giganteus*, etc., to illustrate a paper on "Luminous Insects," read by Mr. K. G. Blair. (See page 31.)

Mr. Hy. J. Turner exhibited a copy of Madam Merian's "Metamorphosis Insectorum Surinamensium," 1726, in which is an illustration of *Fulgora lanternaria*, showing various stages of growth.

MAY 20th, 1914.

Mr. Buckstone exhibited the hybrids resulting from a pairing of *Nyssia zonaria* male and *Apocheima hispidaria* female. Some 300 ova were laid, of which most were fertile, but the larvæ were constitutionally weak and gradually died, so that only four imagines were bred, one male and three females. It was noted that the larvæ varied but little *inter se*, and much resembled those of *A. hispidaria*. Mr. Newman called attention to the interesting fact that the larva of *N. zonaria* was smooth, while that of *A. hispidaria* was rough, suggesting that there must be considerable structural difference between the two species, and that such a crossing was rare.

Mr. W. West (Greenwich) exhibited a specimen of the extremely rare hemipteron, *Pygolampis bidentata*, taken by him in the New Forest in the early part of the present month. Saunders, "Hemiptera-Heteroptera," p. 160, 1892, says, "Of this curious genus we have only one species, and its place in our list depends on a solitary record." It was taken "under a piece of red sandstone, Quatford, Salop, in September," by Thos. Marshall.

Mr. L. W. Newman exhibited a living pupa of *Strymon pruni*, and called attention to its close resemblance to a bird's excrement.

Mr. Gahan exhibited a species of "mealy bug," which he had met with two years running on flowering currant in his garden at Bedford Park. He supposed it to be *Pseudococcus citri*, a species met with as a pest in hothouses.

MAY 23rd, 1914.

Field Meeting at Pickett's Hole, Ranmore Common.

Leaders, E. Step, F.L.S., *and* Hy. J. Turner, F.E.S.

Altogether 26 members and friends took part in this Field Meeting, of which nearly a dozen went down in the early part of the day and collected in the woods, lanes and pastures of the northern slope of Ranmore Common. Fortunately for them the weather was fine and much good collecting was obtained; but unfortunately for the afternoon party there was torrential rain in London and right down as far as Ashtead; and the Ranmore Common area, although not actually under rain, was cold and dull. At Leith

Hill a thunderstorm was in progress most of the afternoon, but no rain fell until after tea in the area which the party was exploring.

Although but few notes have been sent in to us, probably most of the species of lepidoptera met with are recorded in them.

Mr. Dunster, who did not come down until the afternoon, reports that he took numerous nice forms of both sexes of *Agriades thetis* (*bellargus*) and *Polyommatus icarus*, some *Hesperia malva* and *Nisoniades tages*, *Cœnonympha pamphilus* and *Anthrocera trifolii*, including several confluent forms. He says: "There being no sun, all the above were taken as they were resting on the grass stems, and were in excellent condition. I noted some battered specimens, but this was no doubt due to the previous evening's thunderstorm. After tea, on the way back to Box Hill station, I observed *Hepialus lupulinus* flying among the rough grass, and took one rather worn specimen of *Xylophasia rurea* on a fence, but did no serious collecting, it being cold and wet."

Among the butterflies, *Pieris brassicæ*, *P. rapæ*, and *P. napi* were met with; *Euchloë cardamines* both as imago and ova, the latter in the lane from the station. Hibernated specimens of *Gonepteryx rhamni* were seen, and a number of *Hamearis lucina* met with in one of its restricted stations. *Brenthis euphrosyne* occurred sparingly, and both *Aricia medon* (*astrarche*) and *Celastrina argiolus* were to be taken, while a few *Adopæa flava* (*linea*) were seen. One example of *Callophrys rubi* in worn condition was captured. Old examples of *Spilosoma mendica* occurred, and several specimens of *Nola confusalis*. Of the last-named genus, *N. cucullatella* was met with in the larval stage, as were also the larvæ of *Ptilophora plumigera*. Among the more or less day-flying noctuæ were *Plusia gamma*, *Euclidia mi*, *E. glyphica*, and *Phytometra viridaria* (*ænea*). A considerable amount of beating was done, but neither imagines nor larvæ were at all plentiful. The geometers taken were *Rumicia luteolata* (*cratægata*), *Ephyra annulata*, *Asthena candidata*, *Cabera pusaria*, *Ematurga atomaria*, *Leptomeris* (*Acidalia*) *remutaria*, *Lozogramma petraria*, *Eupithecia vulgata*, *Xanthorhoë sociata*, *X. montanata*, *X. fluctuata*, *Cidaria corylata*, *Camptogramma bilineata*, and *Anaitis plagiata*. Larvæ were obtained of *Tæniocampa stabilis*, *Calymnia trapezina*, *Mellinia ferruginia* (*circellaris*), and *Miselia oxyacanthæ* among the noctuids; while of the geometers larvæ were met with of *Ourapteryx sambucaria*, *Opisthograptis* (*Rumia*) *luteolata* (*cratægata*), *Phigalia pedaria* (*pilosaria*), *Hybernia aurantiaria*, *Boarmia repandata*, *Abraxas grossulariata*, *H. marginaria*, *Selenia bilunaria* (*illunaria*), etc.

Among the pyrales only *Botys pandalis* was reported, and of the tortrices, *Tortrix ministrana* occurred. Mr. Stallman reports that he took larvæ of *Bithys quercus*, and that from a female of *Boarmia consonaria* he obtained ova, and has a large brood of larvæ. Most of the characteristic chalk plants were abundant, most conspicuous, perhaps, being the great mullein (*Verbascum thapsus*), by reason not only of its enormous numbers, but of the great size and vigour of the individuals, which promised a wonderful display of flowers a little later. On the way back to tea, several members were shown the habitat of the bearsfoot (*Helleborus viridis*), where thousands of fine plants filled a copse and overflowed around it.

JUNE 11*th*, 1914.

Mr. L. E. Dunster exhibited blue females of *Polyommatus icarus* from Horsley, one of which was an extreme form.

Mr. Edwards exhibited specimens of exotic butterflies, including *Clothilda insignis* and *Amphirene superba* from Costa Rica, *Cænophlebia archidona* from New Grenada, and *Amnosia eudamia* from Borneo.

Mr. West exhibited the following species of coleoptera recently taken by him in the New Forest (May 16th to May 24th, 1914) :—*Lacon murinus*, *Elater sanguinolentus**, *E. miniatus**, *E. elongatulus**, *Corymbites bipustulata* var.*, *Sericosomus brunneus**, *Athous hæmorrhoidalis**, *C. quercus*, *C. tessellatus**, and *Dolopius marginatus*, together with *Ischnomera cærulea* and *I. sanguinicollis*.

Mr. B. S. Curwen exhibited the following species of Anthroceridæ (Zygænidæ) taken by him on the the continent during his holidays of the past few years :—*Anthrocera rhadamanthus* and var. *cingulata*, *A. carniolica* var. *hedysari*, *A. fausta*, *A. sarpedon* var. *balearica*, *A. brizæ* var. *corycia*, *A. filipendulæ* var. *cytisi*, *A. transalpina* var. *astragali*, *A. anthyllidis*, *A. ephialtes* var. *athamantha* and var. *peucedani*, *A. achilleæ* var. *tristis*, *A. stæchadis*, and *A. erythrus*.

Mr. Hy. J. Turner communicated the following note :—At a recent meeting of the Society Mr. Hocking exhibited some branches of gorse, *Ulex europæus*, which had been completely killed by a mite, *Tetranychus lintearius*, and covered by a closely woven web of a pearly white colour.

Those marked * were taken on whitethorn blossom.

The species exhibited belongs to the spinning mites, of which the well-known "red-spider" of the gardens is another member.

T. lintearius was first observed by M. Dufour, at St. Sever, in France, and in the "Ann. Sc. Nat.," in 1832, he gives an account of his observations. He describes the conspicuous, milky or opaline white web clothing the thorny bush in every direction, as a layer of fine muslin, with numerous patches of a kind of red dust, often agglomerated, at times disseminated, especially after the long continuance of fine weather. This dust he found to be "animalcules" in extreme abundance. Some of these he put in glass tubes to further examine, and there they quickly spun their webs in quantity, apparently uniting their efforts, so that there was no flaw or gap in the resultant structure.

Other French observers have also noticed it. M. Lucas, in "Ann. Soc. Ent. Fr.," 1869, records it from Normandy and Brittany. M. Laboulbène, in 1865, in the same Society, says that the camellia is attacked by this species of mite, which spins a white web under and on the leaves, and much disfigures the foliage by white spots and blotches. M. Boisduval records it under the leaves of syringa.

One would be inclined to suggest that the species observed on the camellia was not the same as that which is attached to the gorse, as in the former case the webs, although made by societies of individuals, are small affairs, while those made by the gorse-frequenting species are of comparatively enormous dimensions.

So far I have met with no previous records of the occurrence of *T. lintearius* in this country, but possibly that is merely only an expression of my omission to search sufficiently into the literature of economic natural history.

It will be recalled to mind that Mr. Step referred to a species of mite with a similar habit of spinning a huge area of web, which he had met with, I believe, at Mickleham. This was another species of *Tetranychus*, *T. tiliarum*, a minute yellowish, or orange coloured species, which attacks the leaves of lime, and often covering the trunks and branches of the trees with a very finely spun web, giving them a bright glazed appearance.

In most cases it appears that for the mites to obtrude themselves in this way upon the ordinary observer, there must be a concurrence of very fine and dry weather just at the right time in spring or early summer, and in addition a peculiarly favourable state of other atmospheric conditions."

JUNE 20th, 1914.

FIELD MEETING AT BEACONSFIELD AND WINCHMORE HILL.

Leader.—HY. J. TURNER, F.E.S.

This neighbourhood is somewhat of a favourite, and if well worked would no doubt produce a very large range of species on the varied ground comprised in the area. The flora of the neighbourhood is also very interesting. It is one of the localities for the very local plant *Dentaria bulbifera*, which was found in quantity in the depths of the shade of woods, of course not in flower, but conspicuous at the moment by its dying leaves with a naked stem bearing the jet black bulbils from which the plant got its specific name. Mr. Sich met with another very local plant in *Pyrola minor*, or lesser winter-green, somewhat abundant among the brushwood in a wooded valley. Several orchids were found, including the bee, *Ophrys apifera*, close to the station, and in the large beech woods were numbers of stems of the saprophytic *Neottia nidus-avis* or bird's nest orchis. Not far from the station were clumps of the deadly nightshade, *Atropa belladonna*, unfortunately on ground soon to be built over. In the big woods were large areas of the foxglove *Digitalis purpurea*, and one large open space in the wood was overgrown largely by *Hypericum perforatum*, which turned out to be a prolific spot for various species of lepidoptera, including plenty of *Agrotis segetum* and *A. exclamationis*, *Leucania lithargyria*, *L. comma*, and numerous Tortrices, of course including *Catoptria hypericana*.

In the same clearing the leaves of figwort (*Scrophularia nodosa*) were almost entirely destroyed by the abundant larvæ of the coleopteron *Cionus scrophulariæ*, some of them already in their cocoons that mimic the fruits of the plant. On the hazels, too, large numbers of rolled leaves showed that *Apoderus coryli* had been busy; but none of the beetles were found.

A number of plants of lesser broomrape (*Orobanche minor*) were found on clover at the edge of a field of peas.

As usual, there was a morning party, who took a different direction, and picked up the afternoon party at the station about three o'clock. Most of the rhopalocera met with were taken in the early part of the day, the species being *Pieris rapæ*, *P. brassicæ*, *P. napi*, *Euchloë cardamines* (a few), *Polyommatus icarus* (common), *Rumicia phlæas* (few), *Cœnonympha pamphilus*, *Epinephele jurtina*, *Aricia medon*, *Cupido minimus* (a colony on the railway bank), specimens of *Hesperia malvæ* and of *Augiades sylvanus*. Colonies of the larva of *Aglais urticæ* and of *Vanessa io* were met with. On trunks of trees specimens of *Dianthœcia cæsia* and *Hecatera serena* occurred. A few cocoons of *Anthrocera filipendulæ* were seen, *Spilosoma menthastri* on a fence, and in the evening one or two *Spilosoma lubricipeda*, *Hepialus humuli* and *Leucania comma* were caught. Some of the morning party took *Acontia luctuosa*, *Lomaspilis marginata*, *Xanthorhoë montanata*, *Bapta temerata*, *Cabera pusaria*, *Cidaria corylata*, *Iodis lactearia*, etc., by beating, and on trunks of trees *Mesoleuca ocellata* and *M. albicillata*. *Camptogramma bilineata* was by no means the ubiquitous nuisance it often is at this time of the year. A few *Plusia gamma* were flying, and *Mamestra* (*Hadena*) *dentina* was taken from a tree trunk.

Mr. Edwards reported *Scoparia ambigualis*, *Scopula olivalis*, *Crambus margaritellus*, *C. hortuellus*, *C. pratellus*, *Emmelina monodactyla*, and *Alucita pentadactyla*. It was noted that the leaves of the burdock were completely free from the attacks of the larvæ of *Porittia galactodactyla* in the valley where it is usually found in much abundance. On a piece of waste ground *Xanthosetia hamana* was taken.

Several members remained later in the evening to sugar and search the lamps. The following species were taken :—*Xylophasia rurea*, *X. lithoxylea*, *Apamea gemina* (fairly common), *Miana strigilis*, *M. arcuosa*, *Caradrina morpheus*, *Agrotis segetum*, *A. exclamationis*, *Noctua festiva*, *Dianthœcia carpophaga*, and *Hecatera serena* among the Noctuids, and *Acidalia aversata*, *Asthena candidata* (common), and *Iodis lactearia* in the geometers.

An excellent tea was served at Winchmore Hill, and the walk back by a different route was much enjoyed.

JUNE 25*th*, 1914.

Mr. E. Step, F.L.S., in the chair.

Messrs. K. G. Blair and H. Main exhibited a number of interesting items collected by them in their recent holiday in the neighbourhoods of Meiringen and Lugano.

1. Living larvæ of a coleopteron, *Crioceris* sp.? feeding on black bryony, *Tamus communis.*
2. A living wasp, *Polistes gallica*, on its nest.
3. Living glow-worms, *Lampyris noctiluca.* It was stated that the females were in the habit of stationing themselves on walls near cracks or openings and there waiting for the males. As soon as they were paired they crept away into the crannies and the light disappeared. It was supposed that the species was both polyandrous and polygamous. One female had the wing and elytron on one side quite well developed although shrivelled.
4. Living fireflies, *Luciola italica*, both males and females. They were seen to flash brilliantly when placed in a dark position in the room.
5. A nearly full-fed larva of a species of anthrocerid (zygænid).
6. Several species of Mollusca, including a *Helix* and a large *Clausilia.*
7. A field cricket, *Gryllus campestris*, found by Mr. Ashdown, who met them at Lugano.
8. Several fine specimens of the alpine newt (*Molge alpestris*).
9. A number of young slow-worms.
10. The larva of a large species of bombyx, subsequently found to be *Pachygastria trifolii.* It fed on *Cytisus.*
11. A short series of the coleopteron, *Cetonia stictica.*
12. A number of *Gnophos glaucinaria*, with ova, etc.

Mr. Priske exhibited an example of the large slug, *Arion ater*, of the white variety var. *albida.* It was stated that this slug varied much in colour even on the same ground; a beautiful red form (var. *rubra*) occurred in places, and had been met with near Amersham.

Mr. Coulson exhibited a long series of females of *Polyommatus icarus*, taken at Horsley and Clandon, in which there was considerable male coloration, and some were splashed with very whitish-blue. He also showed a *Cœnonympha pamphilus* with a bipupillate apical spot on the forewing, and another with three well developed eyespots on the surface of the hindwing.

REPORT OF DELEGATES TO THE CONGRESS OF THE SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES, held at Bournemouth.

By E. STEP, F.L.S.

Read JULY 9th, 1914.

The nineteenth annual Congress, which was held at Bournemouth from the 10th to the 13th of June, was attended by both your delegates throughout. In a matter of this sort, where the venue is changed every year, and the conditions varied, it would be invidious to make nice comparisons between the congresses of different years; and only one who had attended them all would be justified in making such a comparison. But it would probably be safe to say that the Congress of 1914 cannot have fallen behind any of its predecessors. Sufficient time had been allowed to the local committees to fully organize, and in all their efforts they appear to have been heartily supported by the Mayor and Corporation of the County Borough.

The latter body placed at our disposal a fine range of apartments in the new Municipal College at Lansdowne, so that our operations could be carried on without crowding; and the Congress Museum was displayed in a number of well-lighted and spacious rooms, where its contents could be studied with comfort. The lectures were varied, and each afternoon there was a choice of three excursions, so that although the archæologists had their full share as usual, it was not obtained at the expense of the naturalists, as on some former occasions. The hospitality committee, too, appears to have left nothing undone that could minister to the comfort of the guests, and if the other delegates were as fortunate in this respect as the writer of this report the arrangements must be pronounced perfect.

On Wednesday afternoon the members foregathered in the reception-rooms, and after the mutual salutations of old friends and new acquaintances, walked through the town and the public gardens to Alum Chine. In the evening the Congress was formally opened by the Mayor in an address of welcome, and the new President, Dr. P. Chalmers Mitchell, delivered the Presidential Address—on "Science and Life," an eloquent attempt to trace the development of consciousness and the various reactions consequent upon it.

On Thursday morning we began at 9.15 with a meeting of the Council, followed at 10 by the Delegates' session at which various reports of officers were received, and the decision arrived at to accept the invitation of the Mayor and Corporation of Brighton, supported by all the local societies, to hold the Congress of 1915 at London-by-the-Sea. Our own Society was honoured by the selection of our member Prof. Raphael Meldola as the President-elect, and other useful business transacted. The Delegates' Meeting was followed by two lectures: by Mr. W. Munn Rankin on "The Vegetation of the Bournemouth District," and by Dr. W. T. Ord, on "The Scenery of Bournemouth and its Geological History." In the afternoon there was a choice of excursions to Heron Court and Wimborne Minster, New Milton and Barton Cliffs, and the meadows and marshes at the mouth of the Stour by Christchurch Priory. Your delegates chose the latter and enjoyed a delightful ramble amid the varied and abundant vegetation of the marshlands.

In the evening was the great social event of the Congress—the reception by the Mayor and Mayoress, supported by the President, and attended by a large concourse of local friends. The conversazione that followed was spread over a range of thirteen commodious apartments, where the scientific side-shows were installed, so that although the attendance was very large the very varied exhibits could be examined with comfort. It was certainly the most successful gathering of the kind in connection with the Union that I have attended. The Bournemouth Natural Science Society, which was responsible for the lecturettes and demonstrations, is to be congratulated on the success of this part of a brilliant function.

On Friday morning your delegates were again at work early, with a Council meeting at 9.15. At 11 an old friend of our Society in the '80s—the Rev. J. E. Kelsall, M.A.—gave a lecture on the "Flora of the New Forest," and was followed by Mr. A. F. Ravenshear, B.Sc., on "Applied Science and the Patent System." In the afternoon the visits included Christchurch Priory and Hart's Museum for one party, and a drive all around Bournemouth for another to elucidate the part geology had played in the configuration of the district, and how the characteristic chines had been formed. Both parties included a visit to the wonderful Honeycombe Chine at Boscombe, and all, to the number of several hundreds, combined in a garden party at Michelgrove House, where the Congress Photographic Group was taken. In the evening Sir Ronald Ross gave a lantern lecture on "Some Points of Interest in connection with Tropical Medicine," dealing in a most interesting manner with the methods by which sleeping sickness, malaria and tsetse-fly disease (Nagana) had been fought in India and Panama.

On Saturday morning at the delegates' meeting further reports were received from committees, and the thanks of the Congress voted to officers and the local committees, hosts and hostesses, to whom the great success of the Congress was due. Following this final business meeting, lectures were delivered by Mr. E. A. Martin on some "Problems of Coast Erosion," and Mr. Rhys Jenkins on "The Beginnings of the Alum Industry in England." In the afternoon excursions—archæological, botanical and geological—were made to Corfe Castle and the neighbouring moors and to Swanage.

So ended a most delightful Congress, which was attended by six of our members. It is a matter for regret that a larger number do not avail themselves of the advantages accruing through our affiliation with the South-Eastern Union. The gatherings are held under exceptionally favourable conditions, in the best month of the year, the lectures are educational, and the excursions, led by the most capable local authorities, introduce one to the finest localities for natural history work, and there is every facility for making the acquaintance of kindred spirits, not only of the locality in which the Congress is held, but also of workers from all parts of the South-Eastern counties. One lives at rather high pressure, for a good week's work is compressed into half the time; but the experience is stimulating, and something to look back upon with pleasure. Is it too much to hope that at next year's Congress at Brighton, under the presidency of one of our own members, the South London Entomological and Natural History Society will be represented by a far larger number?

JULY 9th, 1914.

Mr. A. E. GIBBS, F.L.S., F.E.S., *Vice-President*, in the chair.

Mr. L. W. Newman remarked on the difficulty usually met with in killing anthrocerids (zygænids), and said that he had found immersion in petrol for a few moments caused instant death and did not cause the slightest damage to the specimens, which were fit to be set as soon as the temporary rigor had passed away.

Mr. Newman exhibited living larvæ of *Gastropacha ilicifolia* from ova laid by the female captured last year at Cannock Chase, and of *Celerio gallii* taken in North Cornwall, together with the parent imago of the former species and a curiously suffused and obscure form of what was supposed to be *Dianthœcia capsincola*.

Mr. H. Moore exhibited a living specimen of the large orthopteron *Ægrotus phymatæus*, which had recently been brought from South Africa.

Mr. J. Platt Barrett exhibited (1) ova-shells of *Melanargia pherusa* and small larvæ of the same species, obtained by him in Sicily this year. (2) Living larvæ of a beetle which was in some abundance in his son's garden in Messina. (3) Several mole-crickets, *Gryllotalpa vulgaris*, from Sicily. (4) A large species of centipede from the same locality.

Mr. W. West exhibited examples of oak leaves which were infested with the *Phylloxera punctata*.

Mr. E. Step exhibited several species of living rhynchota, including *Pediopsis tiliæ*, *Psyllopsis fraxini*, *P. fraxinicola*, and the beech aphis (*Phyllaphis fagi*), all from Ashtead. The last named was shown in various stages, from very young nymphs to the imago; the nymphs being remarkable for the blue-tinged white woolly excreta with which they are more or less covered, which makes it difficult to distinguish the individuals of a colony. The larger nymphs have long trails of this material. Another feature is the accumulation on the leaf of large globules of liquid excreta ("honeydew") whose surface is covered with a bluish powder, apparently of wax, which appears to prevent the liquid from running. It was interesting to see the way in which several blood-red nymphs of the bug, *Anthocoris sylvestris*, ran about the leaves with the proboscis extended in front and spearing the *P. fagi* nymphs with it.

Mr. R. Adkin exhibited a series of *Celastrina* (*Cyaniris*) *argiolus*, reared between March 25th and May 24th last, from larvæ taken on the flower-buds of ivy at Eastbourne, in September, 1913. The females, as a rule, followed the usual spring form in having the black borders of the forewings comparatively narrow, but in one example they were broader and continued around the anal angle, thus closely approaching the usual form of the autumn emergence. In one specimen the lower of the outer pair of costal spots of the hindwings on the underside was elongated. (See "Proc.," 1913-4, p. 132.)

Mr. Hy. J. Turner exhibited the whole of the plates of the four volumes of Rösel's "Insekten Belustigung," 1746(2)-1761, and of Kleemann's additional volume, bound together, with an autograph letter of William Spence (Kirby and Spence), December, 1812, thanking Captain Machell for the loan of the volume, which he had kept for such a long time.

Mr. A. E. Gibbs exhibited a drawer showing some of the species and forms of the genus *Parnassius*, and communicated the following note:—"There are among them some forms of our two commonest European species, *Parnassius mnemosyne* and *P. apollo*. The former does not exhibit so great a range of variation as the latter, though I believe there are about 30 named forms of it. I show two rather ordinary specimens, one from the Pyrenees, which I suppose the books would call *pyrenaica*, and one from Central Russia. Then there is a large, strongly-marked form from the Thian Shan mountains, in Turkestan, which Staudinger calls *gigantea*, and which is well worth a varietal name. The other form I show is *melaina*, Honr., from Styria, which is a rather dark variety occurring in parts of Austria. Belonging to the same group as *mnemosyne* is *stubbendorfii*, of which I show the Japanese form, *citrinarius*. The species which I suppose will interest us most is *Parnassius apollo*, because it is to all of us the most familiar species of the genus. The true *apollo* of Linnæus is generally believed to be the Scandinavian form, of which I show a male and female, though this form, which is larger than Alpine specimens, has also been given a varietal name, *scandinavica*, for what reason I do not know. It is fairly abundant in parts of Sweden and Norway, and I remember seeing *apollo* flying in some numbers on the Omberg and other hills around the great lakes. The Central European form, which is so common in collections, is known as *geminus*, Stich., but *geminus* is split up into a large and I think absurd number of minor varieties, and it seems impossible to take up a German entomological paper without seeing some new name given. There are, of course, some very distinct races of *apollo*, which well deserve to be separated, but in many of the cases in which names are given the differences are very trifling. I notice that Dr. Verity, in the "Index Systematique," in the beginning of his valuable work "Rhopalocera Palæarctica," has compiled a list of no fewer than 52 named forms, in addition to 27 aberrations, while Stichel, who deals with the genus in Seitz's "Macro-Lepidoptera of the World," contents himself with naming 27 forms and 17 aberrations. I show, besides the forms I have named, one called *vinningensis* from the Moselle district, another from the Maritime Alps named *valdieriensis*, a south French form called *provincialis*, and some very distinct insects, quite giants, from Central European Russia and Central Asiatic Russia. The latter appears to be *P. apollo* var. *sibiricus*, under which name I received it, but the large European forms, which come from Tula, some 200 miles south of Moscow, I take to be the insect called by Oberthür var. *uralensis*, but as that name was preoccupied by a form of another species of *Parnassius* it has been re-christened by Stichel *limicola*. Of the aberrations of *P. apollo* I show the one which is perhaps the best known, ab. *pseudonomion*, distinguished by the two red apical spots. There are in the drawer two forms of *P. apollonius*, while of another Asiatic species, *P. delphius*, of which there are about 30 named forms, I show six. I would specially draw your attention to the two dark specimens, one of which has been named *infernalis* by Elwes, and the other, an extremely melanic variety, has been called by Staudinger ab. *styx*. The species named by Oberthür *P. imperator* is a fine insect, while the next, *P. hardwickii*, Gray, is very variable and beautiful. The other species exhibited are *P. discobolus*, *P. romanovi*, *P. bremeri*, and two forms of *P. jacquemontii*."

Mr. J. Platt Barrett said that he had met with *Parnassius* at Kandersteg as early as June 25th.

Mr. E. Step read a report of the meeting of the Congress of the South-Eastern Union of Scientific Societies at Bournemouth, which he and Mr. Hy. J. Turner attended from June 10th to 13th last.

JULY 18th, 1914.

FIELD MEETING AT SWINLEY WOODS, ASCOT.

B. S. CURWEN, *Conductor*.

This was quite a new district to the Society, and but few members had visited it before. More than a dozen went down together in the afternoon, and in spite of only occasional sunshine a fair number of insects was taken or observed. Several members, but not all, sent lists, of which the following is a summary:—There were seventeen species of rhopalocera, *Pieris brassicæ*, *P. napi*, *P. rapæ*, *Pyrameis cardui*, *P. atalanta*, *Limenitis sibylla*, *Argynnis adippe*, *Dryas paphia*, *Epinephele jurtina*, *E. tithonus*, *Aphantopus hyperantus*, *Cœnonympha pamphilus*, *Hipparchia semele*, *Bithys quercûs*, *Polyommatus icarus*, *Adopæa flava* (*thaumas*), and *Augiades sylvanus*. Larvæ of *Smerinthus ocellatus*, *Notodonta dromedarius*, *Sarrothripa revayana* (*undulanus*), and *Anarta myrtilli*. In the bombyces, *Hylophila prasinana*, and *Porthesia similis*. A race of *Anthrocera trifolii*, *Agrotis strigula*, and *Rivula sericealis*. The geometers were *Acidalia aversata*, *A. bisetata*, *Eupithecia lariciata*, *E. pumilata*, and *Xanthorhoë* (*Melanippe*) *fluctuata*. In the pyrales

Crambus pascuellus, *C. inquinatellus*, and *Eurrhypara urticata*. In the tortrices, *Tortrix heparana*, *T. ribeana*, *Bactra lanceolana*, *Xanthosetia hamana*, and *Penthina betulatana*. Among the Tineæ were *Plutella maculipennis*, *Harpipteryx scabrella*, *Coleophora lutea*, *C. glaucicolella*, *Argyresthia gœdartella*, and *A. brockeella*.

Among "other orders" were the grasshopper *Tetrix bipunctatus*; *Sympetrum striolatum*, *S. scoticum*, *Lestes sponsa*, *Enallagma cyathigerum*, and *Æschna cyanea*; *Hæmatopota pluvialis*, *Chrysops cæcutiens*, *Tabanus bovinus*, *Volucella pellucens*, and *V. bombylans*.

The list is particularly good in view of there having been no morning party, and the ground was not arrived at until after three o'clock. Tea was taken in Ascot village.

JULY 23*rd*, 1914.

Mr. L. W. Newman exhibited a larva of *Celerio galii*, which had fed up in nineteen days from the ovum, and a small larva of the same species. He also showed a full grown larva of *Jochæra* (*Acronicta*) *alni*.

Mr. W. West (Ashtead) exhibited a living example of a species of weevil, which had been found in some state papers from South Africa.

Mr. Dennis referred to the fact that we had three species of "stinging nettle" in this country, *Urtica urens* the small nettle, *U. dioica* the large nettle, and *U. pilulifera* the Roman nettle. Of these he exhibited the last named species, which was by far the most uncommon; it was the worst stinger and was distinctive in its larger flowers, particularly the female blossoms. He also showed the form known as var. *dodartii*, which was characterized by having its leaves entire or nearly so, while those of the typical form are deeply serrate.

Mr. H. Moore exhibited a specimen of the wryneck, *Yunx torquilla*, which had been taken at Westborough Green, Kent.

Mr. Curwen exhibited a dwarf specimen of *Polyommatus icarus* measuring only 20mm. in expanse, which he had taken at Pickett's Hole, near Ranmore.

Mr. Morford exhibited a series of *Syntomis phegea*, hatched from June 20th to July 1st, from ova obtained from a female captured at Iselle, at the southern end of the Simplon Tunnel. The larvæ were fed on dandelion.

Mr. Main showed a number of very small psychids in their little cases, which had emerged from one of the large cases (=cocoons) which he previously exhibited from Lugano. He also showed the recently hatched larvæ of the firefly, *Luciola italica*.

Mr. K. G. Blair exhibited living beetles of two species which he had bred from larvæ found near Lugano.

1. *Crioceris lilii*, Scop., =*merdigera*, F.
   Head and underside black; larvæ feeding on lilies.
2. *C. merdigera*, L., =*brunnea*, F.
   Head and underside (in part) red; larvæ feeding on black bryony. (See ante p. 96.)

Mr. Priske exhibited living larvæ and pupæ of *Melasoma populi*.

Mr. Morford exhibited the large saturniid moths *Philosamia cynthia* and *Antheræa pernyi* from North America and India respectively.

Mr. Step, on behalf of Mr. West (Greenwich), exhibited a large mass of aberrant, probably gall, growths on crack-willow, consisting of an abundance of small twigs. Several members said that they had met with similar growths in various parts of Kent.

AUGUST 13*th*, 1914.

Mr. Stanley Edwards exhibited the large saturniids *Antheræa paphia* from India, *Automeris illustris* and *Citheronia magnifica* from Brazil, *Lamia argulifera* and *L. promethea* from the United States; the sphingids *Psilogramma menephron* from India, and *Oxyambulyx substrigilis* from Burmah, and *Eribomorpha fulgurita* from India, with other species.

Mr. L. Newman exhibited a pair of *Neuria reticulata* (*saponariæ*) from the coast of co. Cork, which were distinctly pink in general coloration; and stated that all examples of the species from the locality were of that tint. He also showed living pupæ of *Selenia lunaria*, and stated that those which would remain as pupæ during the ensuing winter, usually assumed a chocolate coloration, while those which would emerge in the present season as a partial second brood, are bright green.

Mr. A. E. Gibbs showed a large case-bearing larva of a psychid, which he obtained from British Honduras, and which fed on sea-grape (*Cocoloba*) and sweet lemon (*Citrus limetta*). Mr. Step suggested that the species was *Œceticus kirbyi*.

Mr. Curwen exhibited a number of species of the genus *Apatura*, taken by him recently in the woods of Samoussy, south of Laon, including series of *A. iris* and *A. ilia* with ab. *pallescens*, ab. *iliades*, ab. *clytie*, and various intermediates between these forms.

Mr. C. B. Williams exhibited two of the large living larvæ of *Saturnia pyri*, from Syria. He stated that he had examined specimens of the willow-gall which had been exhibited at the last meeting, and had found two examples of a mite of the genus *Eriophyes*. On the continent a gall of the willow has been recorded as due to a species of this genus, and the two are possibly identical, in which case it is doubtless a recent introduction from the continent. Mr. Step said that in the specimen he had examined he had found no traces of mites, or other clue to the formation of these "witches' brooms."

[It has been ascertained since that they are caused by the activities of *Eriophyes triradiatus*.—Ed.]

Mr. Hugh Main exhibited a living pupa of *S. pyri* from Lugano; also eggs of a species of *Ascalaphus* from the South of France.

Mr. Dennis exhibited *Centaurea solstitialis*, a rare alien plant, which was found occasionally in the South of England. His specimens were obtained at Cobham, Kent.

Dr. Chapman exhibited the cases of a psychid, *Oreopsyche pyrenaella*, from Gavarnie in the Pyrenees, and stated that it appeared to remain two years in the larval stage, since small cases could be found as well as the full-size ones, and a peculiar circumstance resulted, *viz.*, that in any one area they were abundant only in alternate years. The cases are beautifully made, with transverse sticks (grass?). For pupation the larva fastens itself on some plant and covers its case all over with a cocoon-like shroud of silk, making the disturbed specimen look as if mouldy. The male larvæ moult after doing this, and later moult to pupæ. The females appear to make only one moult to pupæ. They are rather freely parasitized by a dipteron belonging to the genus *Tachina*, and by a true *Ichneumon*.

AUGUST 27*th*, 1914.

Mr. A. E. Gibbs, F.L.S., F.E.S., *Vice-President*, in the chair.

Mr. T. W. Hall exhibited several aberrations of *Polyommatus icarus*, including a very brilliant blue female from Hertfordshire, fine radiated underside form, some dwarf females from Folkestone, a brown female with a curious horizontal streak on the forewings, and a male with bleached patches at the costa of the forewings.

Dr. Chapman showed imagines and parasites of *Oreopsyche pyre-*

naella, the cases of which were shown at the last meeting, and examples of the two larval skins moulted by the males at pupation, the first the ordinary skin of the feeding larva, the second a thinner and more delicate structure.

Mr. Main exhibited various insects introduced in baskets of cane-sugar, imported from Java, including species of coleoptera, *Blattidæ*, a large cricket, etc.

Mr. B. W. Neave exhibited two aberrations of the female of *Polyommatus icarus* in which the male coloration predominated; one taken at Otford on May 30th, presumably of the first brood, the other from Chipstead, taken on August 14th, and probably of the second brood.

Mr. Stanley Edwards exhibited various species of the pierid genera *Delias* and *Metaporia*, from the Australian and Indo-Malayan regions, and of the genus *Dismorphia* from South America.

The habit of various species of lepidoptera returning again and again to the same spot was discussed by the members. *Catocala nupta*, *Mania maura*, *Gonepteryx cleopatra*, *Amphipyra pyramidea*, etc., being instanced as possessing this trait.

SEPTEMBER 10*th*, 1914.

Mr. W. J. Ashdown exhibited the species of lepidoptera taken by him in June and July of the present year at Lugano and Zermatt, including *Œneis aëllo*, *Pieris napi* var. *bryoniæ*, *Anthocharis simplonia*, *Melitæa dictynna*, several aberrations and forms, several species of *Erebia*, *Nordmannia* (*Thecla*) *acaciæ*, *Polyommatus meleager*, *Aricia eumedon*, *Albulina pheretes*, *Polyommatus eros*, *Syntomis phegea*, etc.

Mr. Hugh Main exhibited the young larvæ of a species of *Ascalaphus*, just hatched. They sat with their jaws wide open ready for prey.

Mr. Hy. J. Turner exhibited a male specimen of *Agriades thetis* with an unusually dark ground colour on the underside, a male *Polyommatus icarus*, in which the submarginal dark spots on the underside were much enlarged and intensified in colour, and several females of the same species with blue and whitish patches, all from Ranmore Common.

Mr. Edwards exhibited some exotic butterflies from South America, including *Smyrna blomfeldia*, *Dynamine setabis*, *Epiphile eriopis*, and *Lasiophila prosymna*.

Mr. B. S. Williams exhibited two aberrations of *Mamestra* (*Barathra*) *brassicæ*, a pale form with aberrant shaped stigmata, and a black suffused form.

Mr. Curwen exhibited a number of species of anthrocerids, and suggested that a discussion on the group might occupy an evening during the winter session.

SEPTEMBER 12*th*, 1914.

FIELD MEETING HELD AT BYFLEET.

STANLEY EDWARDS, F.L.S., F.Z.S., *Conductor*.

The morning party of seven journied to Woking, and worked along the canal from thence to Byfleet. Many larvæ were taken, but nothing of any moment, except *Hadena adusta*, to add to the list already published as the results of previous visits. Among the captures Mr. Brooks reports an imago of *Hadena protea*. Several species of saw-fly were noted in the larval stage, and Mr. Step records the larva of *Athalia scutellariæ*, a local species, which Cameron mentions as only recorded from Gloucester. It is one of the prettiest of the saw-fly larvæ, its colour being black freely spotted with white. It feeds on skull-cap, preferring the flowers. *Pœcilosoma pulveratum*, a species given by the same author as common in Scotland, was met with in great abundance on alder. Of this species Norwich is given by Bridgeman as the only locality. *Impatiens biflora* (*fulva*) in full flower was the most noteworthy botanical record.

The Society has been to Byfleet on several occasions, but scarcely ever has it had a wholly fine day. This visit was no exception to the previous experience, except that perhaps it was worse than any of its predecessors, for the rain started at 1.45 p.m. and did not cease for the remainder of the day. The six who formed the afternoon contingent were only able to take shelter, working for insects being quite out of the question.

SEPTEMBER 24*th*, 1914.

This was an evening for the exhibition of lantern slides.

Mr. B. S. Williams exhibited slides illustrating the ova of the alder-fly, *Sialis lutea;* the stag-beetle, *Lucanus cervus;* the pine lady-bird *Anatis ocellata;* the head and thorax of a proturid, probably a very early phylogenetic form of insect, characterized by there being no antennæ, no eyes, a single clawed tarsus, pointed head and long pointed labrum; ova of the poplar saw-fly, *Nematus populi*; the eggs of an earwig; an adult of a species of "dusky-wing," *Coniopteryx*: and a pupa of a snake-fly, *Rhaphidia maculicollis*, with its long characteristic head and ovipositor.

Mr. Dennis exhibited slides illustrating a lichen, *Parmelia revoluta*, from Seaford, where it existed not anchored to stones or trees, but blown about by the wind; galls on the oak; three stages of an aphis gall on poplar; a fungus gall on nettle, which usually occurred on the stem, but sometimes on the leaf; a fungus gall on the fruit of bird cherry; the flowers of henbane, *Hyoscyamus niger*; and of the rare star-thistle, *Centaurea solstitialis*.

Mr. Sich recorded the occurrence of a striking aberration of *Pyrameis atalanta* at Chiswick, in which the transverse red band of the forewing was extended to the base, enclosing three black spots.

Mr. Newman exhibited a bred series of *Pieris napi*, from Cork and Sligo; among the aberrations were yellow suffused forms, some in which the upper spot of the forewing was strongly extended to the outer margin by very dark and wide lines along the veins, and one remarkable form in which the spots were so enlarged as to coalesce, uniting with the costal blotch to form a wide, continuous transverse band.

Mr. Brooks exhibited a varied series of females of *Polyommatus icarus* from Horsley, Headley and Pickett's Hole, the majority much suffused with blue. One was extremely silvery blue with white on the costa of forewings, others had white wedge-shaped marks on the hindwings, in shape and position similar to those usually found on the underside.

Mr. Newman reported a worn specimen of *Colias hyale* from Folkestone, on September 13th. No *C. edusa* were seen, and both *Pyrameis cardui* and *P. atalanta* were scarce.

Mr. Adkin had seen no *C. edusa* at Eastbourne, but *P. cardui* was fairly common, *P. atalanta* was quite common, and *Aglais urticæ* was scarce.

Mr. Colthrup had seen no *C. edusa* anywhere in the South-East of England during the last eight weeks, although he had cycled over much ground. He had heard of several being seen at Whitstable. Mr. Sheldon had seen a female in Dorset on August 1st; Mr. Lucas had seen one in the New Forest in August.

OCTOBER 8*th*, 1914.

MR. A. E. GIBBS, F.L.S., F.E.S., *Vice-President*, in the chair.

Mr. E. J. Salisbury, D.Sc., F.L.S., read a paper with lantern illustrations, "The Flora of the Sea-shore."

OCTOBER 22*nd*, 1914.

The evening was set apart for a discussion on the genus *Anthrocera*, introduced by Mr. B. S. Curwen, and most of the exhibits were relative to this subject.

Mr. Curwen exhibited a small type-collection of Palæarctic Anthroceridæ, which contained the following species and forms:—

SPECIES.	FORM.	LOCALITY.
erythrus.	—	Marseilles.
purpuralis.	—	Éclepens.
,,	var. *nubigena.*	Abersoch; Caux; 3 to 2 Refuges on Simplon.
brizæ.	var. *corycia.*	Syria.
scabiosæ.	—	Mürren.
sarpedon.	var. *balearica.*	Balearic Islands.
stoëchadis.	ab. *dubia.*	Alpes Maritimes.
anthyllidis.	—	Pyrenees.
ephialtes.	—	Val d'Annivers.
,,	var. *medura.*	,,
,,	var. *peucedani.*	Liebenau; Issy.
,,	var. *athamanthæ.*	,,
exulans.	—	Montana; Handeck.
,,	var. *vanadis.*	Braemar; N. Shetlands (?)
meliloti.	—	New Forest.
,,	var. *ehnbergii.*	?
graslini.	—	Lebanon.
achilleæ.	—	Tiniéres Valley; Gèdre, Pyrenees.
,,	var. *bellis.*	3 to 2 Refuges.
rhadamanthus.	—	Isére; Venee.
,,	var. *cingulata.*	Canales, Spain.
hilaris.	—	Marseilles.
fausta.	—	Lardy; Dompiérre-sur-Marne; Digne.

,,	... ab. *segugata.*	... Gibraltar.
carniolica.	... —	... Montana.
,,	... var. *hedysari.*	... Isére; 3 to 2 Refuges on Simplon.

Dr. E. A. Cockayne exhibited:—

(1) Half the series of *Anthrocera hippocrepidis* from the late J. W. Tutt's collection with the original labels, two of which read: "This drawer contains the whole of the series of this species, which is nearer *trifolii* than *filipendulæ* structurally: described "N. H. Brit. Lep.," i., 522-538;" and "*stephensi*, Dupont., *tutti*, Staud., *hippocrepidis*, Stphs.," respectively. Also a specimen of *A. trifolii* taken from the same colony at Chattenden. The rest of the series is now in Mr. P. A. Buxton's collection.

(2) Early *A. filipendulæ* from Portland, from Enniskillen, where it flies with *A. loniceræ*, from Bundoran, where a larger spotted form is found, from Folkestone, where it flies with *A. trifolii-minor*. *A. loniceræ* and *A. trifolii* from these localities are also shown.

(3) A series of *A. filipendulæ* and *A. trifolii* from two colonies found in marsh-land near Oxford, which produce imagines in June. The *A. trifolii* are nearer to *A. trifolii-major=palustris* than to *A. trifolii-minor*.

(4) Series of *A. trifolii-minor* (Surrey) and *A. filipendulæ* (Surrey).

Mr. A. E. Tonge exhibited short series of British species of anthrocerids, including a black form of *A. trifolii*, a yellow form of the same species, and a six-spotted form of it.

Mr. L. W. Newman exhibited a series of *A. filipendulæ*, including forms with yellow, pink, and salmon coloration.

Mr. F. H. Stallman exhibited anthrocerids, as follows:—

A. trifolii.—Taken at Pickett's Hole.—June 4th, 1911.—One female: forewings with spots confluent, hindwings with decidedly narrow border. May 19th, 1912.—Two pairs taken *in cop.*, one female similar to female mentioned above, but border of hindwings still narrower. May 30th, 1914.—One female; spots on forewings very small and widely separated, border of hindwings very broad.

A. loniceræ (?).—Three very worn, taken at Ascot, July 18th, 1914. Spots on forewings fairly well separated, border of hindwings fairly narrow.

A. filipendulæ (?), *hippocrepidis.*—Emerged June 20th-24th 1914, and one July 5th, 1914, from cocoons taken at Pickett's Hole, May 30th, 1914, when also several larvæ were noticed. All these specimens, except the one which emerged on July 5th, and which seems typical *filipendulæ*, have the sixth spot clearly divided by the dark nervure, and in some cases the spot is small and indistinct. The border of the hindwings varies considerably in breadth in both sexes, but in no case is it very broad.

A. filipendulæ.—Two apparently typical specimens, emerged July 14th and 15th, 1914, from cocoons taken at High Wycombe, June 27th, 1914; no larvæ were noticed on this day, but a number of worn, apparently *A. filipendulæ*, were flying.

A. filipendulæ.—Emerged July 20th to August 4th, 1914, from cocoons (containing unturned larvæ) taken at Pickett's Hole, on July 12th, 1914. These appear to be more or less typical *A. filipendulæ*, and are very small specimens. On August 18th, this year, all *A. filipendulæ* seen in this locality were much smaller than those seen in previous years. The forewings of all these specimens have the sixth spot indefinitely divided. The border of the hindwings varies very slightly in both sexes, but on the average is noticeably narrower than in the specimens bred in July. Worn specimens were flying on July 12th, when these cocoons were collected.

Mr. A. W. Buckstone exhibited:—

(1) *A. filipendulæ* (?).—Emergence July 18th-21st, 1906. Pupæ collected at Box Hill. Narrow border to hindwings. Slight indication of line through sixth spot.

(2) *A. filipendulæ* (?).—Captured July 14th, 1914, on top of downs near Ranmore Church. Breadth of border to hindwings varies. Very slight indication of line through sixth spot.

(3) *A. hippocrepidis* (?).—Emergence June 18th-20th, 1914. Pupæ collected at Pickett's Hole (fairly moist hollow at foot of chalk downs). Broad border to hindwings of males, and many of the same sex with a distinct line through sixth spot.

(3*a*) *A filipendula* or hybrid *filipendulæ* × *hippocrepidis.*—Emergence July 16th-August 4th, 1914. Pupæ collected at Pickett's Hole. Mostly small specimens. Males with a broad border to hindwings and a slight indication of line through sixth spot.

(4) *A. filipendula*, meadow form, or *filipendulæ* × *trifolii* hybrid (?), as *trifolii* occurs in the district. Emergence July 23rd-26th, 1907. Pupæ collected at Esher (soil gravel, flat and marshy). Broad border to hindwings of males, and majority with a slight line through sixth spot. Tips of wings inclined to be rounded. A heavily-built insect.

Dr. T. A. Chapman exhibited a drawer of Anthroceridæ captured during the last few years, including many of the Western European species, amongst the more Southern being *A. hilaris*, *A. contaminei*, *A. sarpedon*, *A. anthyllidis*, *A. rhadamanthus*; about sixteen species altogether.

Mr. Hy. J. Turner exhibited a number of the Alpine species of *Anthrocera* from many localities, mainly of the five- and six-spotted species. The *Transalpiniformes* group, including some of the five-spotted form from the Channel Islands, a series of large and confluent-spotted *A. trifolii-major* = *palustris*, from the Isle of Wight, a short series of small *A. trifolii* from Surrey and Kent, a small six-spotted male with well-divided sixth spot, taken at Zermatt, *in cop.* with a large five-spotted female.

Mr. L. W. Newman exhibited :—

(1) Long and varied series of *Dianthœcia barrettii* bred from wild larvæ collected in County Cork, and from pupæ dug in South Devon. In the Irish form melanic specimens are rare, but in the Devon they are more abundant. A point that is interesting is that the Devon specimens as a series are smaller than the Irish. In the Devon series are three examples of a decided ochreous shade; this form does not appear in the Irish series.

(2) Series of *Boarmia repandata*, all bred from wild larvæ collected in a small radius in the Wye Valley, the range of variation being remarkable, including melanic specimens equal to the Sheffield form, very pale examples like some from Scotland, var. *conversaria*, and almost every intermediate form.

(3) Series of the same insect from North Cornwall, bred from wild larvæ, and showing considerable variation.

(4) Series of hybrid *ocellatus* × *populi* and extreme forms of *A. populi*.

Mr. Tonge exhibited hybrid *ocellatus-populi* bred from ova in 1913-14, and an example of *Rumicia phlæas* taken at Deal in September, 1914, in which there was entire absence of the usual red submarginal band on the hindwing.

Mr. Page exhibited two cabinet drawers illustrative of the British anthrocerids, *viz.*, *Anthrocera purpuralis*; *A. exulans* with ab. *minor* (Braemar); *A. viciæ* (*meliloti*); *A. loniceræ* (Chattenden and the New Forest) with ab. *minoides* and ab. *orobi*; *A. trifolii* and sub sp. *palustris*; *A. filipendulæ*; and a series of *A. hippocrepidis* taken at the same time and place (Chattenden, May, June, 1892) as those from the late Mr. J. W. Tutt's collection, exhibited by Dr. Cockayne.

In opening a discussion on the Anthroceridæ, Mr. B. S. Curwen read the following notes:—

It is with some diffidence that I enter into this discussion, as it is only quite lately that I have given the family any serious attention.

One has, however, only to read up a few authorities on this interesting group to realize that considerable doubt exists as to the arrangement and specific separation of many forms.

To illustrate my points I have brought up a small series of typical European species and their varieties.

Considering first the two interesting and involved species, *Anthrocera trifolii* and *A. lonicera*, I exhibit a small store-box which contains a series of each species, including named varieties of *A. trifolii*.

These two species appear in the imaginal state at much the same time. The egg, the larva, the pupa, and its cocoon, are practically indistinguishable in both species. It is therefore of interest to consider the differences in the imago.

The antennæ of *A. lonicera* are stated to be longer and more slender than those of *A. trifolii*, and Seitz makes the somewhat sweeping statement that the two species can at once be separated by these differences. Measurements made on the antennæ of specimens in this box indicate a range of antennal length for *A. trifolii* from 8mm. to 10mm., with an average of 9mm., and for *A. lonicera* 9mm. to 12mm., with an average of about 10mm. With regard to thickness and shape it is difficult, at least in dried and set specimens, to detect any difference.

The next point of difference is in the width of the black border, which is considered to be narrower in *A. lonicera*. The specimens of *A. trifolii* shown have a black border varying from about 1mm. to 2·5mm., and those of *A. lonicera* from ·5mm. to 2mm. The hindwing is stated to be more pointed in *A. lonicera*, and there is certainly a tendency in this direction. *A. lonicera* is generally a bigger insect.

On the other hand all the above points of difference are subject to such variation that it is only in the case of specimens which combine all, or most, of the characteristics of one or other of the two species that anything approaching a definite determination can be made.

Some of my specimens, taken on the French coast, at Aubengues, near Wimereux, in a very restricted locality, on July 17th, this year, are big insects, much of the appearance of *A. lonicera*: but many taken at the same time, at the same spot, are undoubtedly *A. trifolii*: and we therefore have either the case of both species flying together in one small locality (about half an acre), or that both forms are *A. trifolii*, or hybrid *trifolii* × *loniceræ*.

I do not know of any references to the genitalia of these two species, and it would be interesting if any one here could say whether these have been examined.

Barrett, in "British Lepidoptera," states that he separated these species in deference to generally accepted opinion, both here and on the Continent; but he doubts their specific distinctness, and mentions that W. H. Fletcher has found them to interbreed readily, and to produce offspring which remain fertile for many generations. To add to the complexity, large specimens of *A. trifolii*, taken in numbers in July or early August, are termed *palustris* by Oberthür, and treated by Tutt as a sub-species. Again, six-spot specimens of *A. trifolii* have been taken, and *A. trifolii* and *A. filipendulæ* have been found paired quite a number of times.

Before leaving these two species it may be of interest if I mention some of the more important vars. of *A. trifolii* which are represented in this box.

1. Firstly, the type is really a four-spot burnet, as the two central spots are coalesced.
2. Ab. *orobi* is the true five-spot form, and occurs everywhere with the type.
3. Confluent specimens are firstly ab. *glycirrhizæ*, with Nos. 3, 4 and 5 spots more or less connected.
4. Ab. *basalis* is the reverse of this with spots 1, 2, 3 and 4 connected.
5. Ab. *trivittata*, all spots connected by threads of red.
6. Ab. *minoides*, all spots confluent, forming a more or less regular red patch.
7. Ab. *intermedia*, specimens tending towards yellow.
8. The full yellow form, of which I have no specimens, is ab. *lutescens*.

I have a curious specimen from Pickett's Hole, with four minute red spots on the left wing and five on the right wing.

There is also a pair *in cop.*, which I have never separated, taken at Aubengues. These are large insects, the female, otherwise typical *A. trifolii*, is four-spotted, and the male is ab. *orobi*.

I might mention that in some years, for example last year, quite half the specimens of *A. trifolii* taken at Pickett's Hole were of the confluent form *minoides*, and in all years this form is very plentiful there.

I have no *lonicera* vars., and, as far as British specimens are concerned, can find none taken in Surrey, but I have put in a few from York, one from Bridlington, and one from the New Forest.

In this drawer I have a number of specimens of *A. filipendulæ* from this country and the Continent. The varieties shown are:—

ab. *flava*, the yellow form.

ab. *cytisi*, in which the spots are confluent in pairs.

ab. *ochsenheimeri*. A specimen of this form sent me from central Italy appears to be practically identical with var. *hippocrepidis*.

var. *hippocrepidis*. A form with the black border broad, tending towards of that of *A. trifolii*, and the sixth spot bisected by a black vein.

With regard to this form, Barrett does not mention it; Seitz., who terms it ab. *tutti*, defines it merely as having a "broad black, sinuous marginal band to hindwing." South states that in two localities where he finds it there was a flourishing colony of *A. trifolii* in each case: and for this reason, plus the fact that *A. trifolii* and *A. filipendulæ* are known to pair, he considers *hippocrepidis* a hybrid between the two.

A good locality for *hippocrepidis* is Pickett's Hole, and as both *A. trifolii* and *A. filipendula* occur there plentifully, and late *A. trifolii* may overlap early *A. filipendulæ*, a summary of the results bred from a number of *A. filipendulæ* pupæ from that locality this year may be of interest. Out of seventeen specimens emerging between June 26th and July 8th, only four had the narrow border and no trace of vein division of the sixth spot, and one of these is ab. *cytisi*, *i.e.*, spots confluent in pairs, and another has spots 3, 4 and 5 joined by a red line, two have the narrow border and but faint trace of sixth spot division, two have narrow borders and decided spot division (one of these is a dwarf, 26mm.). Eight are typical *hippocrepidis*, and one is a beautiful yellow specimen, ab. *flava*.

A circumstance I have not seen mentioned before is a decided tendency for the sixth spot in *hippocrepidis* to obsolescence; and I have included specimens from Mickleham with the sixth spot missing, yet they were bred from amongst a number of cocoons which gave otherwise typical *A. filipendulæ*. Also one five-spot *hippocrepidis* from St. Anne's-on-Sea.

The specimens of *A. transalpina* in the same drawer indicate the decided difference in coloration of the typical form as compared with *A. filipendulæ*. Specimens of the vars. *astragali*, *italica* and *maritima* are also shown.

Dr. E. A. Cockayne, F.E.S., contributed the following summary of his remarks:—

"Without going into the vexed question of nomenclature it may be stated that of our six-spotted burnets (*A. hippocrepidis* and *A. filipendulæ*) there are early and late colonies, with dates of emergence in May-June, and July-August respectively, but others occur where the date of emergence is intermediate. The general facies of members of these colonies varies considerably, but there is nothing to support the view that early *filipendulæ* usually have the sixth spot small and separated by a black line, or the other features ascribed to *hippocrepidis*, or that this form is confined to the early specimens.

"Some early colonies do produce a majority of small-spotted specimens, others a majority of large-spotted specimens, such as the Bundoran colony. But small-spotted specimens agreeing with *hippocrepidis* do occur not infrequently in some late colonies.

"I have examined the genitalia from the mixed colonies shown to-night, and from various other five- and six-spotted colonies, and in every case find the five-spotted insects have the uncus bifid, but blunt, whereas the six-spotted have a bifid uncus with long tapering horns. Tutt's *hippocrepidis*, including a specimen with only a few red scales on the underside of one forewing to represent its sixth-spots, all show the bifid uncus of *filipendulæ*, but his five-spotted burnet shows the uncus of *trifolii*. None showed an uncus with intermediate structure.

"This confirms Bateson's results, which Tutt quotes in his "British Lepidoptera," vol. i., pp. 420 and 544, and those of Buchanan-White and Pierce, but in spite of it Tutt regarded his *hippocrepidis* as nearer *trifolii* than *filipendulæ*. He says that he has observed *trifolii* fail while *hippocrepidis* increased proportionately on the same ground, and regards this as a support to his view, which is based on observations in the field.

"In his cabinet he says *hippocrepidis* is *structurally* nearer *trifolii* than *filipendulæ*, though he avoids this curious error in his book.

"It is clear that these two species are absolutely distinct, and that hybridization in nature cannot be common, and does not account for the specimens intermediate in appearance between *trifolii* and *filipendulæ*, such being indistinguishable from *filipendulæ* in genital armature.

"With regard to the antennæ of the burnets I agree fully with what Mr. Curwen says.

"*Lonicera* tends to have longer and more tapering antennæ than *trifolii*, and in addition the terminal segment of *lonicera* is usually fully extended and pigmentless (red in colour); that of *trifolii* blunter, with a partially retracted terminal segment, which is fully pigmented (black in colour).

"My Oxford *trifolii* are invariably of this type, but I have seen exceptions from other colonies. A Hampshire colony invariably shows intermediate pigmentary characters.

"Early and late *filipendulæ* are usually of the *lonicera* type, with unpigmented tip, but intermediate and fully pigmented ones occur. All the Oxford *filipendula* are entirely devoid of pigment.

"In my examination of the antennæ of various species I did discover one interesting point. All the *transalpina* examined had a patch of white scales on the last scaled segment or last two scaled segments. This is very obvious with a lens. If it is a constant character, or even a usual one, it may prove very valuable. White scales are never found in British six-spotted burnets, but are very conspicuous in *ephialtes*, which, as Mr. Curwen says, is in some other respects near *transalpina*.

"With regard to the status of *lonicera*, this species has a very distinct facies, difficult to put into words, and is very constant. It is the only species of five-spotted burnet found in Ireland. Apparently it is much more fertile with *filipendulæ* than *trifolii*. Pierce says that the genitalia are unlike those of *trifolii*, there being teeth of different shape on the penis. On these grounds I regard it as a separate species.

"The early and late *filipendulæ* must be grouped as one species at present. I consider that the differences in appearance and time of emergence in different colonies are due to their isolation and marked tendency to minor variation in rate of growth of larva and in imaginal characters. The larvæ are alike and the pupæ placed in the same situations. Slight differences occur in the genitalia, but only in the size of the different parts, and are probably to be regarded as mere variations, like those which occur in the wing characters in different colonies, but my material is insufficient to make me sure of this point.

"If a new species is to be found at all I think *A. trifolii-minor* will supply it.

"In addition to a marked difference in appearance from *palustris*, both in the larval and the imaginal states, the cocoon is hidden on or near the ground, while that of *palustris* is always high up.

"This is not due to any special conditions, for early *filipendulæ* on the same ground as *trifolii-minor* makes a cocoon high up on grass stems.

"This difference of habit seems to me of more importance than slight differences of appearance in such a variable genus as that of *Anthrocera*."

Mr. Robert Adkin confined his remarks to the *hippocrepidis* question. He said that forms of at least three species had been described under this name, and it was therefore desirable before entering upon a discussion that we should know just which form we were talking about. First, there is the insect described by Hubner, which is now generally regarded as a form of *Anthrocera transalpina*, Esp., a six-spotted species somewhat resembling *A. filipendula* in superficial appearance, but differing from it in essential details. This same form was also described by Ochsenheimer, and figured by Herrich-Schäffer, figs. 54 and 55, where the underside of the forewings shows the red marking as one large blotch, covering the greater part of the area of the wing, not as well-defined, red spots on a pale reddish ground as in *A. filipendulæ*. He also figures a yellow form, fig. 56, while Hubner figures a yellow and a pink form, all being under the name *hippocrepidis* and all apparently being referable to *A. transalpina*. Then there is *hippocrepidis* of Herrich-Schäffer, figs. 52 and 53, a form of *A. ephialtes*, L., another six-spotted but very distinct species, among other marks of differentiation being its red-banded abdomen. Neither *A. transalpina* nor *A. ephialtes*, nor any of their forms, are known to occur in Britain, and may therefore be dismissed from our present consideration.

The third *hippocrepidis* is that mentioned by Stephens, who described it from specimens which he says he took "in a field near Coombe Wood, on 20th June, 1810, and subsequently near Darenth Wood." He also mentions a yellow form bred from larvæ found on wild liquorice near the latter habitat. In his description he says that it "varies in size like *A. filipendulæ*, which it greatly resembles; but the border of the posterior wings is considerably more distinct than in that insect, and undulated internally; the sixth spot on the anterior wings (the one towards the anal angle) is generally small, with a coloured nervure passing through it; the under surface of the anterior wings with the disc entirely red, and the maculations not defined—the abdomen immaculate." If we have any *hippocrepidis* in Britain it must be this one mentioned by Stephens as having been first found here in June, 1810, and which he does not claim to be new to science, but erroneously refers it to *hippocrepidis*, Ochsenheimer. Mr. Adkin said that during the past few years he had seen a considerable number of specimens which were regarded by their owners as *hippocrepidis*, some simply because they had emerged in June, and others because they showed the sixth spot small in size and intersected by the coloured nervure, or had these features in conjunction with a comparatively broad and undulating margin to the hindwings; but none of these appeared to show the immaculate red underside of the forewings mentioned by Stephens. A theory had also been put forward that Stephens' *hippocrepidis* was found only when *A. trifolii* and *A. filipendulæ* flew together, and that it was a hybrid between those two species, but he was not aware of any direct evidence to support such a theory. In illustration of his remarks he exhibited series of *A. filipendulæ*, including (A) a specimen taken on June 26th, at Northwood, in which the sixth spot was exceedingly small and intersected by a coloured nervure, and the margins of the hindwings were broad and distinctly undulated internally, together with a typical *A. filipendulæ* taken on the same day within a few yards of it. In this locality *A. trifolii* was known to occur, but there was no reason for supposing that the first-named specimen was anything more than a form of *A. filipendulæ*. (B) Specimens similar to the first-named together with typical *A. filipendulæ*, all reared on July 29th from pupæ collected near Westerham, in a locality where, so far as was known *A. trifolii* did not occur, and indeed a most unlikely spot for that species. (c) A series of *A. filipendulæ* reared on June 13th-15th, which bore none of the features described by Stephens as differentiating *A. hippocrepidis*. He further said that he could not help thinking that Stephens having found a form of *A. filipendulæ*, at a somewhat early date for the species, that was new to him, and being cognisant of Ochsenheimer's description, and possibly also of Herrich-Schäffer's figures, he had seen a little more in the immaculate red colouring of the underside of the forewings of his specimens than was really there; but whether that was so or not he considered we were quite wrong in applying the name *hippocrepidis* to any of the specimens that had recently been passing under that name.

Mr. P. A. Buxton communicated the following notes:—

"A POSSIBLE EARLY RACE OF ANTHROCERA FILIPENDULÆ.—This note is written without access to any of my own note books. In 1911 I took a male *A. filipendulæ* on June 12th, near Rugby; and in that particular spot the emergence was over by the end of June. The species has never in my experience been abundant in that field. In subsequent years this little colony has emerged early, if my recollection is correct; in fact the burnet moths are on the wing simultaneously with the foresters (*Adscita statices*). Less than a mile away, in a sheltered railway cutting, is a very much larger colony of burnets. The great majority of this colony is *A. loniceræ*, which is in most years extremely abundant. Around the edge of this great colony scattered six-spots are found—*A. filipendulæ*. Now the whole of this colony, whether five- or six-spotted, emerges, as is only proper, at the end of July. It is most unfortunate that I am separated from my notes, but at any rate a month intervenes between the emergences of these colonies, which are situated within a mile of each other. It would be most interesting to hear of other members' experiences. If these early colonies occur are they generally small and weak?

"Early emergences in the south of England are perhaps less remarkable, but I took a single male *A. filipendulæ* on June 19th, 1914, near Tonbridge, and the species was fairly common on Caldey Island, Pembrokeshire, from June 26th onwards. I am perfectly familiar with the differences between *A. filipendulæ* and *A. hippocrepidis*. I should be extremely pleased to correspond with anyone who would favour me with his experiences."

Apropos of the discussion on the Anthroceridæ, Mr. Hy. J. Turner contributed the following data and notes:—

I. THE HIPPOCREPIDIS OF STEPHENS.

Tutt in "British Lepidoptera," vol. i., p. 532 (1899), gave the following synonymy:—Steph., "Illus.," i., p. 109 (1828); Wood, "Ind. Ent.," iv., fig. 6 (ab. *flava*) (1839); Kirby, "Cat. Lep. Het.," p. 70 (1892); "Handbook," p. 94 (1897); Tutt, "Ent. Record," ix., pp. 87-88, 103-104, 106, 169 (1897); South, "Entom.," xxx., pp. 181-3 (1897); *ochsenheimeri*, Boden, "Entom.," xviii., p. 317 (1883); South, "Entom.," xxiv., p. 233 (1891); *filipendulæ*, ? Newm., "Brit. Moths," p. 24 (? 1869); Briggs, "Trans. Ent. Soc. Lond.," pp. 434-5 (1871); Tutt, "Ent. Record," ii., p. 110 (1891).

It must here be noted that although Stephens in "Illus. British Lep." particularly says his insect is the *hippocrepidis* of Ochsenheimer, Tutt in his account utterly ignores all Ochsenheimer's references.

The *hippocrepidis* of Stephens, "Illus.," p. 109 (1828, June 30th), is thus described by him: "Alis anticis nigro-cyaneis, maculis sex rubris, subtûs omninò confluentibus, posticis rubris margine sinuato viridi-cyaneo, abdomine immaculato." =*Z. hippocrepidis* of Ochsenheimer. =*A. hippocrepidis* of Stephens' "Catalogue" (1829 or—8 ?).

The following is the description of the *hippocrepidis* of Ochsenheimer in "Schmett. Eur.," ii., p. 63 (1808):—"Alis anticis nigro-cyaneis, maculis sex cinnaberinis, subtus omnino confluentibus; posticis rubris margine sinuato nigro; abdomine immaculato."

There are slight differences in these two descriptions. The six spots are described as "rubris" in Stephens and as "cinnaberinis" in Ochsenheimer, while the hind-margin is "viridi-cyaneo" in the former and "nigro" in the latter. The former terms are doubtless synonymous, but the latter show more divergence, which can probably be considered as an expression of the condition or age of the specimens before the respective writers.

In his appended notes to the description Stephens adds the following:—

(1) Varies in size like *filipendulæ*, which it greatly resembles.

(2) Border of hindwing considerably more distinct, and undulated internally.

(3) Sixth spot small, with coloured nervure through it.

(4) Under surface of forewing with disc entirely red; maculations not defined.

(5) Food-plant of larva, wild liquorice (*Astragalus glycyphyllos*).

We must remember that Stephens tells us in his introductory remarks on Lepidoptera, vol. i., page 3, that he has been aided by the work of Ochsenheimer, whose death he deplores.

II. The hippocrepidis of Ochsenheimer.

The references given by Ochsenheimer are as follows:—["Schm. Eur.," vol. ii., p. 63-4 (1808)].

Hübner, "Sam. eur. Schm.," Sphinges, plt. 5, fig. 32, ♀, =*loti* (smaller than *filipendulæ*, hind margin wide, fold indent pronounced, 6th spot less than 5th);[*] Plt. 17, fig. 83, ♂, =*hippocrepidis* (small yellow form, cf. *loti* with no 6th spot);[*] Plt. 22, fig. 105 =*hippo-*

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[*] Notes in small brackets are my comments on Hübner's, etc., figures. —H.J.T.

crepidis (pale red no basal streaks, one large blotch on outer margin towards apex, one near anal angle, two spots in cell, one at base and one at apex, one spot midway below)* (1805).

Hübner, "Sam. eur. Schm.," Sphinges, Text. p. 79, no. 12 =*hippocrepis* (*hippocrepidis ?*), syn. *transalpina* (1805).

Hübner, "Gesch. eur. Schm.," Larvæ Lep., vol. ii., Sphinges, i., fig. 2, *a*, *b*, *c*. (1806 ?).

Hübner, "Beit. z. Gesch. Schm.," vol. ii., pt. ii., plt. ii., fig. G., p. 39=*loti* (1790).

Borkhausen, "Rhein. Mag." vol. i., p. 631, no. 12, *astragali* (1793).

Füessly, "Magaz.," vol. i., p. 126, no. 2, plt. 1, fig. 2 ; p. 139, *filipendulæ;* (1778) vol. ii., p. 299 (1779).

Esper, "(Eur.) Schmett. Abb.," vol. ii., plt. xxxv. (="Suppl.," plt. x.), fig. 1, p. 224. *loti* [alis superioribus-lutescenti-viridibus; maculis sex, tribus paribus coadunatis; inferioribus rubris]. Probably a confluent aberration, outer and middle pairs coalesced, hind margins of hindwings narrow (1779).

Borkhausen, "Eur. Schm.," vol. ii., p. 28, no. 19 ; p. 123, no. 18 ; p. 238, *loti !* after Esper. (The indication of *filipendulæ* which is suggested in this, is afforded by the yellow feet and the yellowish green ground colour of the forewings.) (1789.)

Borkhausen, "Rhein. Mag.," vol. i., p. 640, no. 18, *serpylli ?* (after Esper's *loti*). (1793.)

De Villars, "Linn. ent.," vol. ii., p. 113, no. 55, *loti* (after Esper). (1789.)

The substance of Ochsenheimer's general remarks are :—[Vol. ii., p. 64-6.]

The antennæ are thin, gradually becoming thicker, with an indistinct brownish apex ; head, thorax and abdomen black-blue, the last without a red girdle ; the feet turn brownish only when the imago becomes somewhat worn ; the forewings are shorter than in *A. filipendulæ* and more rounded ; the ground colour is black-blue, metallic shining, very seldom with a greenish shimmer ; the fringes are brownish at the tips ; the six spots deep, sometimes red-lead colour ; the basal pair of spots is elongated, truncated in front ; the two other pairs are of nearly equal size ; and the outer pair has an oblique position to the middle pair ; between the lower basal—and middle—spots are sometimes found two dots of the colour of the spots, often only one is seen ; on the underside the spots are all so run together into one spot, differing in this character from all the other *Anthrocera* species ; this disc is, in wholly typical examples, of a deep red sharply separated from the surrounding area; sometimes also on the upperside the spots coalesce in pairs.

The divergences from *A. filipendulæ* are, (1) Underside of forewings. (2) Shape of forewings. (3) The hindwing is more pointed, inner margin more curved, and the outer margin is quite different.

III. THE HIPPOCREPIDIS OF BOISDUVAL.

Boisduval, in 1829, "Essai sur une Monographie des Zygénides," p. 76, redescribed the species, which Ochsenheimer had introduced, as follows:—

"Alis anticis atro-cœruleis aut virescentibus, maculis sex cinnabarinis, subtus omnino confluentibus; posticis rubris, margine cyaneo; antennis clavatis, apice albis; abdomine haud cingulato." *i.e.* Forewings blue-black or greenish, with six cinnabar spots, run altogether on the underside; hindwings red, with bluish margin; antennæ clubbed with white tips; abdomen not banded.

It is one-third smaller than *filipendulæ*. Its red spots have a distinctive shade (miniacée). The latest authority on the genus, Clemens Dziursynski, in "Berl. Ent. Zeit.," vol. liii., p. 85, gives it as a form of *A. transalpina*, but his coloured figure, plate i., fig. 10, does not show white tips to the antennæ nor is the hind margin of the hindwings so delicate. $=$*A. transalpina* var. *occidentalis*, Oberth. (*A. hippocrepidis-occidentalis*, Oberth., = *hippocrepidis*, Bdv.)

IV. THE HIPPOCREPIDIS OF HERRICH-SCHÄFFER.

"Schmett. Europ.," vol. ii., page 41 (1845).

The following is the diagnosis of *hippocrepidis* (H.S.):—

"Maculis cinnabarino-miniaceis, subtus in discum magnum conjunctis."

The substance of Herrich-Schäffer's remarks is as follows:—

The red is near the colour of red-lead; on the underside of the forewing it is very indented, dense, and sharply defined, and the six spots are never separately defined; the forewing is much bellied on the inner margin, especially in the male, their apex somewhat sharper than in *A. filipendulæ;* forewing often bluish; always six spots; the middle pair most obliquely-situated towards one another very rarely united, usually of equal size, the lower one somewhat higher than wide, slightly angled; the two outermost almost always of equal size, more often united; that towards the hind margin larger and more remote from the anal angle than in the other species, that towards the costa often higher than broad; below the spots are united by a red suffusion which is scarcely less deep than they are.

In the Supplement Herrich-Schäffer figures his *hippocrepidis* (fig. 54).

V. LIST OF BRITISH ANTHROCERIDS AND THEIR NAMED FORMS.

In a very able paper published in 1908 in the "Berl. Ent. Zeit.," vol. liii., Clemens Dziurzynski divides the Palæarctic Species of the Genus *Zygæna*=*Anthrocera* into three large groups, *viz.*, I. the PURPURALIFORMES, in which we have *purpuralis*, etc.; II. the TRANSALPINIFORMES, in which we have *trifolii*, *filipendulæ*, etc.; and III. the CARNIOLICIFORMES, in which we have *achilleæ*, etc. He discusses and shortly diagnoses the various species, races and aberrations, and gives two very good plates of coloured figures.

The following abstract gives a list of our British species and their various named forms:—

PURPURALIFORMES.

Anthrocera purpuralis, Brü., "Danske Atlas," i., p. 686, =*pilosellæ*, Esp., "Die Schm.," ii., p. 186 (1781), =ab. *dilatata*, Burgf., "Ent. Zeit., Int. Ent. Zeit.," xx., p. 153.
- var. *græca*, (Stgr.) Tutt, "Ent. Rec.," v., p. 273.
- ab. *polygala*, Esp., =*minos*, Esp., "Schm. Abb.," ii., p. 222, =ab. *marginata*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., 153.
- ab. *rubicundus*, Hbn., "Eur. Schm.," ii., fig. 137.
- ab. *grossmanni*, Rühl., "Soc. Ent.," iii., no. 24, (1890), =ab. *lutescens*, Tutt, "N. H. Brit. Lep.," i., p. 434.
- ab. *obscura*, Tutt, "N. H. Brit. Lep.," i., p. 337.
- ab. *separata*, Tutt, "Brit. Lep.," i., p. 434 (1899).
- var. *sareptensis*, Stgr., "Cat. Lep. pal.," p. 380 (1901).
- var. *diaphana*, Stgr., "Berl. Ent. Zeit., p. 31 (1887).
- var. *nubigena*, Ld., "Verh. zoo-bot. Ver. Wien.," ii., p. 93 (1852).
- ab. *pluto*, Och., "Schm. Eur.," ii., p. 26, = ab. *confluens*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 153 (1906).
- ab. *heringi*, Zell., "Stett. Ent. Zeit.," v., p. 42 (1844).
- ab. *interrupta*, Stgr., "Cat.," ed. ii., p. 45 (1871).
- ab. *sexmaculata*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 153 (1906), = *interrupta*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 153.
- ab. *cingulata*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 153 (1906).

ab. *rubrianata*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 153 (1906).
ab. *grisescens*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 154 (1906).

TRANSALPINIFORMES.

Anthrocera trifolii, Esp., "Die Schm.," ii., p. 223 (1783).
ab. *incarnata*, Trti., "Nat. Sicil.," xx., plt. i., fig. 17 (1907).
ab. *lutescens*, Cock., "Ent.," xx., p. 152 (1887).
ab. *semilutescens*, Higgs., "Ent. Rec.," i., p. 12.
ab. *obscura*, Tutt, "N. H. Brit. Lep.," i., p. 487.
ab. *intermedia*, Tutt, "N. H. Brit. Lep.," i., p. 487.
ab. *seriziati*, Obthr., "Et.," i., 33 (1876).
var. *orientalis*, Hormuz., "Soc. Ent.," xvii., p. 139 (1902).
ab. *gracilis*, Fuch., "Stett. e. Zeit.," xli., p. 118 (1880).
ab. *orobi*, Hüb., "Eur. Schm.," ii., fig. 133.
ab. *minoides*, Selys., "Cat. Lep. Belg.," p. 23 (1837), = *confluens*, Stgr., "Cat.," 2nd, p. 47 (1871), = ab. *rubescens*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 162 (1906).
ab. *extrema*, Tutt, "N. H. Brit. Lep.," i., p. 485.
ab. *lutescens-confluens*, Tutt, "N. H. Brit. Lep.," i., p. 488.
ab. *trivittata*, Spr., "Stett. e. Zeit.," xxxviii., p. 40 (1877).
ab. *basalis*, Selys., "Ann. Soc. Ent. Belg.," p. 59 (1872).
ab. *lutescens-basalis*, Tutt, "N. H. Brit. Lep.," i., p. 488.
ab. *glycirrhizæ*, Hb., f., 138, = ab. *confluens*, Dz., "Jahr. Wien. Ent. Ver." (1903), p. 49.
ab. *lutescens-glycirrhizæ*, Tutt, "N. H. Brit. Lep.," i., p. 488.
ab. *obsoleta*, Tutt, "N. H. Brit. Lep.," i., p. 485.
var. *syracusiæ*, Zell., "Isis," p. 301 (1847).
ab. *palustris*, Oberth., "Et.," xx., p. 44, plt. 8, figs. 151-3.
ab. *sexmaculata*, Oberth., "Et.," xx., p. 48-50, plt. 7, figs. 151-152.
ab. *sexmaculata-confluens*, Oberth., "Et.," xx., p. 48-50, plt. 7, fig. 153.
ab. *nigricans*, Oberth., "Bull. Soc. Ent. Fr.," p. 220 (1907).

Anthrocera lonicerœ, Schev., "Naturforscher," x., p. 97.
ab. *semilutescens*, Hew., "Ent. Rec.," i. p. 60 (1890).
ab. *lutescens*, Hew., "Ent. Rec.," i. p. 60 (1890).
ab. *citrina*, Spey., "Stett. e. Zeit.," xlviii., p. 334 (1887), = *flava*, Oberth., "Et.," xx., p. 43, plt. 8, p. 148 (1896).
ab. *chalybea*, Auriv., "Nord. Fjäril.," p. 53 (1888).
ab. *eboracæ*, Prest., "Ent.," xvi., p. 273 (1883), = *carnea*, Spul., "Gr. Schm. Eur.," p. 159.

ab. *major*, Frey., "Lep. der Schweiz.," p. 67 (1880).
ab. *latomarginata*, Tutt, "N. H. Brit. Lep.," i., p. 468.
ab. *minor*, Tutt, "N. H. Brit. Lep.," i., p. 467.
ab. *cuneata*, Tutt, "N. H. Brit. Lep.," i., p. 468.
ab. *trivittata*, Tutt, "N. H. Brit. Lep.," i., p. 468, = *confluens*, Dz., "Ent. Zeit., Int. Ent. Ver.," xix., p. 185 (1906).
ab. *centripuncta*, Tutt, "N. H. Brit. Lep.," i., p. 468.
ab. *bercei*, Sand., "Cat. Lep. Auv.," p. 35 (23), = *achilleæ*, Hb.-Gey., "Sam. Eur. Schm.," 165, = *confluens*, Selys., "Bull. Ent. Soc. Belg.," xxvi., p. cxiii.
ab. *rubescens*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 162 (1906).
ab. *privata*, Burgf., "Ent. Zeit. Int. Ent. Ver.," xx., p. 162 (1906), = *giesenkingi*, Wagn.
ab. *diaphana*, Burgf., "Ent. Zeit., Int. Ent. Ver.," xx., p. 163.
? var. *medicaginis*, Bdv., "Mon. des Zyg.," p. 66, = *charon*, Bdv., "Icones," p. 61 (1834).

Anthrocera filipendulæ, L., "Sys. Nat.," 10th ed., p. 494.
ab. *minor*, Tutt, "N. H. Brit. Lep.," i., p. 509.
ab. *flava*, Rob., "Yng. Nat.," v., p. 236, = *cerinus*, Reb., "List Brit. Lep.," p. 7 (1885), = *lutescens*, Cock., "Ent.," xx., p. 151 (1885), = *citrinus*, Webl., "Ent. Rec.," i., p. 33.
ab. *chrysanthemi*, Bkh., "Sys. Besch.," ii., p. 166.
ab. *intermedia*, Tutt, "N. H. Brit. Lep.," i., p. 510.
ab. *aurantia*, Tutt, "N. H. Brit. Lep.," i., p. 510.
ab. *miniata*, Tutt, "N. H. Brit. Lep.," i., p. 510.
ab. *griscescens*, Oberth., "Et.," xx., p. 45, plt. 8, fig. 135.
ab. *cytisi*, Hb., "Eur. Schm.," p. 81.
ab. *confluens*, Oberth., "Et.," xx., p. 45, plt. 8, fig. 132.
ab. *bipunctata*, Selys., "Ann. S. Ent. Belg.," p. cxiv. (1882).
ab. *communimacula*, Selys., "Ann. S. Ent. Belg.," p. cxiv. (1882).
ab. *conjuncta*, Tutt, "N. H. Brit. Lep.," i., p. 512.
ab. *trivittata*, Tutt, "N. H. Brit. Lep.," i., p. 507.
ab. *mannii*, H. S., "Sys. Bear.," vi., p. 44.
ab. *arctica*, Schneider, "Trom. Mus. Aarsh.," iii., p. 85 (1880), = *mannii*, Lamp., "Ent. Tidskr.," (1885) p. 30.
ab. *tutti*, Reb.
ab. *ochsenheimeri*, Zell., "Isis," pp. 303-7 (1847).
var. *ramburii*, Ld., "Wien. Ent. Monat.," v., p. 151-2.
var. *gurda*, Ld., "Wien. Ent. Monat.," v., p. 152-3.

var. *laphria*, Frr., “ Neu. Beit.,” vi., p. 135 (1850).

Anthrocera exulans, Hochen., “ Bot. Reisen.,” (1792) p. 265, plt. 6, fig. 2.

ab. *flava*, Oberth., “ Et.,” xx., erklrg., plt. 8, fig. 141 (1896).

ab. *flavilinea*, Tutt, “ Ent. Rec.,” v., p. 267.

ab. *fulva*, Spuler., “ G. Schm. Eur.,” p. 157.

ab. *striata*, Tutt, “ Ent. Rec.,” viii., p. 276, = *confluens*, Dz., “ Deut. Ent. Zeit., Iris.,” p. 363 (1902).

var. *vanadis*, Dalm., “ Konig. Vet. Acad. Hand.,” p. 222 (1816).

var. *subochracea*, White, “ Scot. Nat.,” i., p. 174.

ab. *pulchra*, Tutt, “ N. H. Brit. Lep.,” i., p. 448.

ab. *pallida*, Tutt, “ N. H. Brit. Lep.,” i., p. 449.

ab. *minor*, Tutt, “ N. H. Brit. Lep.,” i., p. 449.

ab. *clara*, Tutt, “ Ent. Rec.,” v., p. 266.

ab. *dilatata*, Burgf., “ Ent. Zeit., Int. Ent. Ver.,” xx., p. 154 (1906).

var. *exsiliens*, Stgr., “ Stett. Ent. Zeit.,” xlii., p. 393.

Anthrocera meliloti, Esp., “ Die Schm.,” ii., pt. 2, p. 10 (1789), = *viciæ*, Schrank., “ Fues. Neu. Mag.,” ii., p. 208 (1785).

ab. *flava*, Burgf., “ Ent. Zeit., Int. Ent. Ver.,” xx., p. 162.

ab. *confusa*, Stgr., “ Stett. E. Zeit.,” xlii., p. 398 (1881).

ab. *confluens*, Tutt, “ N. H. Brit. Lep.,” i., p. 456.

var. *ehnbergii*, Reut., “ Fort. öf. Maoro.,” p. 22 (1893).

ab. *dahurica*, Bdv., “ Icones.,” ii., p. 57, = *buglossi*, Dup., “ Lép. Fr., Supp.,” ii., p. 138.

ab. *dacica*, Car., “ Iris.,” 1893, pt. 4, p. 192, = *annulata*, Car., “ Deut. Ent. Zeit., Iris.,” viii., p. 72.

var. *mongolica*, Stgr., “ Cat.,” ed. iii., p. 383 (1901).

var. *italica*, Car., “ Iris,” viii., p. 71 (1895), = *nigra*, Dz., “ Jahr. Wien. Ent. Ver.,” xvi., p. 85 (1906).

var. *teriolensis*, Spey., “ Geog. Verb. Schm.,” i., p. 462, = *sexpunctata*, Tutt, “ N. H. Brit. Lep.,” i., p. 455.

? ab. *charon*, Hb., “ Eur. Schm.,” ii., f. 21 (1797), = *italica*, Carad., “ Iris.,” viii., p. 71.

var. *sicula*, Calb., “ Iris.,” viii., p. 216 (1895).

ab. *stentzii*, Frr., “ Neu. Beit.,” iii., p. 120.

ab. *decora*, Ld., “ Verh. zoo.-bot. Ver. Wein.,” ii., p. 125.

CARNIOLICIFORMES.

Anthrocera achilleæ, Esp., “ Schm. Abb.,” ii., pt. 2.

ab. *flava*, Dz., “ Deut. Ent. Zeit., Iris.,” xv., p. 337 (1902).

ab. *fulva*, Spul., “ Grs. Schm. Eur.,” p. 156.

ab. *brunnea*, Dz., "Jahre. Wien. Ent. Ver.," xiii. (1903), p. 48.
ab. *blachieri*, Dz., "Jahre. Wien. Ent. Ver.," xvi. (1906), p. 85.
ab. *cingulata*, Dz., "Jahre. Wien. Ent. Ver.," xiv. (1903), p. 48.
ab. *confluens*, Dz., "Deut. Ent. Zeit., Iris.," xv., p. 336 (1902).
ab. *dziurzynskii*, Hske., "Jahre. Wien. Ent. Ver.," xvi., p. 93 (1905).
ab. *viciæ*, Hb., 11.
ab. *bellis*, Hb., 10.
ab. *tristis*, Oberth., "Et.," viii., p. 29.
ab. *antiochena*, Stgr., "Berl. e. Zeit.," p. 34 (1887).
ab. *arragonensis*, Stgr., "Berl. e. Zeit.," p. 34 (1887).
var. *phœnicea*, Stgr., "Berl. e. Zeit.," p. 35 (1887).
var. *bitorquata*, Mén., "Cat. Rais.," p. 259.

NOTE.—GENITALIA IN THE ANTHROCERIDÆ.—The facts as known up to 1899 were summarized by the late J. W. Tutt, in "Brit. Lep.," vol. i., pp. 420-422, based largely upon the writings of Buchanan White ("Ann. Soc. Ent. Fr.," (5) viii., pp. 467-476), F. N. Pierce ("Brit Nat.," 1889, p. 55, and 1892, p. 80), and the investigations and opinions of W. H. B. Fletcher and Dr. Chapman.

NOVEMBER 12*th*, 1914.

MR. A. E. GIBBS, F.L.S., *Vice-President*, in the chair.

Mr. A. Sich exhibited a living specimen of *Pyrameis cardui* picked up from the pavement near the tube station in Holborn that afternoon.

Mr. H. Moore read the following note, and exhibited the species of ant mentioned:—

"NOTE ON A SMALL COLONY OF ANTS IN A BANANA.—Recently one of the Lewisham Sanitary Inspectors (Mr. J. Crowther) sent me a portion of a banana still attached to the stem, containing a small colony of ants, consisting of one large and four small workers, and six larvæ, with a request for information concerning them. Mr. Meade-Waldo of the Natural History Museum has kindly identified them as *Camponotus abdominalis*, Fab., var. *stercorarius*, Fab., and informs me 'it is not infrequently imported in fruit from Jamaica and the West Indies, and is widely distributed throughout South

America.' One of the ants was infested with a small bright red tick, which still awaits identification. Several of the ants were injured in transit through the post, and all died within a few days."

Mr. E. Step exhibited abnormal catkins of hazel (*Corylus avellana*) gathered from a bush on Mickleham Downs. The abnormality consisted in the male catkins having lost their cylindrical form and become more or less globose or pear-shaped. In some examples the upper part of the catkin had become brown and withered. The entire bush, which was apparently in a sickly condition, produced catkins of this type, there being no healthy ones present. This condition was correlated with the presence of "Big Bud;" and he thought it was very probable that it might be due to the same cause—the attack of the gall-mite, *Eriophyes coryli*. The discovery of these catkins had naturally led him to examine many other hazels; but in only one other case during a walk of five or six miles did he meet with similar examples. This was on an apparently healthy tree, whose catkins on the whole were normal, but a fractional percentage were abnormal, and these were borne upon twigs that also suffered from "Big Bud." He thought it probable that a microscopical examination would reveal the presence of the mites between the bracts of the catkins.

Mr. T. W. Hall exhibited a gynandromorphous specimen of *Agriades coridon*, showing slightly dissimilar forewings. The right forewing had patches of blue scaling, which on examination by Dr. Cockayne proved to contain large numbers of androconial scales. Otherwise the specimen was a typical female.

Mr. W. J. Lucas sent a number of lantern slides illustrative of British Land and Freshwater Mollusca, and Mr. Step made remarks on the various species as they were shown on the screen.

NOVEMBER 26*th*, 1914.

ANNUAL EXHIBITION OF VARIETIES.

The *President* in the Chair.

Mr. Robert Adkin exhibited long series of *Agriades thetis* (= *Lycæna bellargus*) chiefly from the Sussex South Downs and the Kent and Surrey North Downs. Among the males there were specimens having a row of distinct black spots within the margin of the hindwings, examples of the so-called "green" form and others of the form that had been variously called "lilac," "lead-colour," "French grey" and "black," and which it had been asserted by one and another was a hybrid between *bellargus* and *coridon* and *bellargus* and *icarus*; but he was aware of no evidence to support these suggestions and he thought it far more likely that if the question were thoroughly worked out a solution, both in this and the "green" form would be found in some constitutional character. The females showed much variation in the amount of blue scaling of fore- and hindwings and in the intensity of the marginal red lunules, they being in some specimens practically absent while in others they were so strongly produced as to form almost uninterrupted broad red bands. There was also much variation in the spotting of the undersides in both sexes. In this species as in *A. coridon*, variation appeared to be greater in the specimens from the North Downs than in those from the South Downs.

Mr. W. J. Kaye exhibited a cabinet drawer containing series of the three known species of the genus *Acherontia*, viz., *atropos*, *styx*, and *lachesis* together with coloured maps showing the distribution of each, also preserved larvæ and a pupa case of *atropos*. It was remarked that *lachesis* and *styx* occurred together sometimes. All three species in the larval stage were greatly attached to the Solanaceæ, although in the case of *atropos* a very great number of plants of different orders had been recorded as foodplants. Although *atropos* was occasionally taken in some numbers in Britain, it was essentially an African species. Dr. Jordan, in Seitz' *Macro-Lepidoptera* says that while the larvæ are often infested with tachinids they seem to be avoided by European ichneumons. This remark is probably reprinted from Bartel, for Tutt, in vol. iv. of *British Lepidoptera*, p. 434, gives a number of species of Ichneumonidae including *Ichneumon grossorius*, *Amblyteles laminatorius*, *A. palliatorius*, *A. cerinthius* and *Trogus lutorius*, which have been bred in this country from *A. atropos*.

Mr. H. Worsley-Wood exhibited a long series of *Callimorpha quadripunctaria* (*hera*), bred this year and including many of the form ab. *lutescens*, and also several intermediate forms.

The Rev. G. Wheeler exhibited:—

(*a*) A series of *Plebeius argyrognomon* var. *armoricanus* from N. Brittany taken early in June, 1914; remarkable for the dark ground colour and pronounced orange bands of the underside, one of the males showed obsolescent spotting, and all three females had the spots either elongated or to some extent confluent.

(*b*) A series of *Hesperia alveolus* ab. *taras* from the Rhone Valley.

(*c*) A corresponding aberration of *H. malvoides* from the Laquinthal.

(*d*) A gynandromorph of *P. argyrognomon*, right side female, left male, from the Val Maggia, July, 1914; the body also halved, the male portion protruding beyond the female.

(*e*) A specimen of *Polyommatus icarus* with only the discoidals on the forewing and the discoidals and faint marginal spots on the hindwing, taken at Altmatt, July, 1914.

(*f*) A male *Pararge maera* with the costa of the forewings strongly concave and quite symmetrical, taken on the Via Mala, July, 1914.

Mr. R. M. Prideaux exhibited:—

Melitæa aurelia and *M. athalia* } both from Wiesbaden, 1888, melanistic specimens.

M. didyma, from Switzerland, 1905, spotting obsolescent.

Trichiura cratægi, gynandromorphous specimen, bred, New Forest, 1895.

Strenia clathrata, albinistic specimen, Switzerland, 1907.

Two *Melanargia galathea*, melanistic specimens, Rhone Valley, 1905.

Agriades coridon, female, pale discoidal, and silver-tipped peacock-eyes on hindwings, upperside, Oxted, Surrey, 1914.

Xanthorhoë sociata, banded specimen, Isle of Wight, 1895.

Mr. G. Talbot exhibited on behalf of Mr. J. J. Joicey, two drawers containing rare Exotic Lepidoptera:—

Ornithoptera alexandræ, Roths., a pair, and also a pupa case. *O. rothschildi*, Kenr., a male. *Papilio weiskei*, Roths., a male from New Guinea, and its ally *P. macleayanus*, Leach, from Queensland. A similar species has just been discovered on Ceram, and described by Mr. Rothschild as *P. stresemanni*. *P. weiskei* probably represents a later development of the older green form. *Agrias phalcidon*, Hew., from the Amazon. *Agrias amydon*, Hew., from Colombia. *Callithea sapphira*, Hübn., a pair from the Amazon. *Perisama emineus*, Ob., a very rare species of this genus from Peru.

HEPIALIDÆ from Australia.—*Charagia ramsayi*, Scott, a pair, including a tineid moth which feeds on the larva of *ramsayi*. *Charagia cyanochlora*, Low., a pair. *Charagia mirabilis*, Roths., a pair. *C. lewinii*, Wlk., a small species of the genus, a pair. *Xylotypia stacyi*, Scott, the largest hepialid, a pair; the female measures over 9 inches across the wings.

COSSIDÆ from Australia.—*Xyleutes affinis*, Roths., a pair, also larva, pupa case and the lid which covers hole in tree from which the imago emerges. This lid is cut round by sharp processes found beneath the shoulder flaps of the insect, and when free it is pushed off upon emergence of insect. *Xyleutes lituratus*, Donov., a pair, showing great disparity in size of the sexes, also a pupa of male and one of female.

Mr. A. E. Gibbs exhibited some new world Papilionidæ recently obtained by him and made the following remarks on them:—*P. ornythion*, Boisd. Twelve months ago my friend Dr. Davis and I sent our collector to Guatemala. He spent most of his time in a coffee plantation on the Pacific slope, but on his way home he stopped at a place called Gualan on the Atlantic side about half-way between the capital and the coast. From Gualan he sent me a specimen of *P. ornythion* which is apparently a rare insect. There are two specimens in the Godman collection now at South Kensington, one from Mexico, and one from Guatemala; also a drawing of Boisduval's type specimen in the Bordeaux Museum. When Rothschild and Jordan published their *Revision of the American Papilios* in 1906, there were also two Mexican specimens at Tring. It approaches rather closely the central American form of *P. lycophron*, known as *pallas*, but it has several points of distinction, one of which is the very much narrower yellow median bands, and there is an additional row of spots in the black band on the underside of the forewing which is well seen in my example. Below it is a specimen of *P. lycophron* var. *pallas* for comparison.

P. montezuma, Westw. This specimen was also taken at Gualan on the same journey.

P. columbus, H.Sch. (*gundlachianus*, Feld.). This is one of the most beautiful of the new world Papilios, the brilliant blue band on the forewing and the red distal area on the hindwing adding greatly to its attractions. It is confined to the island of Cuba, and, I believe, to the eastern end of it.

P. sesostris var. *zestos*, Gray. This is a fairly common species in the northern half of Central America and may be distinguished from more southern sub-species by the red patch on the inner margin of the hindwing.

P. lycimenes, two of which I show (♂ and ♀), is another *Papilio* which comes in numbers from Guatemala and other Central American countries.

P. torquatus, Cr., is a Brazilian insect.

P. homerus, F. This fine species is, I believe, found only in

Jamaica and Santo Domingo and is probably the largest of the new world species. It was formerly regarded as a great rarity but is now to be found in most collections as its habits are better known and collectors have learned how to take it. It is a forest insect and a very high flyer, its headquarters being the Blue Mountains in Jamaica.

P. glaucus, L., is an interesting insect, being dichromatic in the female in the southern part of its range, where it is double-brooded. I believe American collectors generally apply the name of *turnus* to the yellow form and *glaucus* to the blackish-brown female form. The large "*turnus*" specimen is of the southern summer form from Alabama and so is the "*glaucus*" female. The spring form is, I believe, smaller and more like the northern form which I show under the subspecific name of *canadensis*, R. and J., and which is found in British North America.

P. marchandi, Bdv. This rather uncommon species I have received both from British Honduras and Guatemala.

P. salvini, Bates. I was glad to receive this rare species from Punta Gorda in British Honduras in March last.

P. cacicus var. *inca*, R. and J. This also is a rarity and comes from Peru.

P. zagreus, *P. bachus* var. *chrysomelas*, and *P. ascolius*, belong to a most interesting mimetic group of Papilios which resemble certain danaines of the genus *Tithorea* and also have a mimetic resemblance to some heliconine species.

The Rev. A. T. Stiff, M.A., exhibited:—

(1) A series of *Epinephele tithonus* from Tavistock, showing a considerable range of colour variation, and including one male with cream ground-colour, two females with golden-yellow ground-colour, two very dark males, one male with the usually fuscous border of a pale mouse-grey, and many showing extra spots.

(2) A series of *Ematurga atomaria* from the Isle of Man, the New Forest, Tavistock, Wye and Folkestone, and including fine yellow forms of the male, several yellowish females, two heavily bordered males, two heavily barred females, and one female with male coloration and marking.

Mr. W. J. Ashdown exhibited British and Swiss *Aphantopus hyperantus* including ab. *arete* and ab. *caca* and several specimens with asymmetrical spotting on the undersides of the hindwings.

Mr. Hy. J. Turner exhibited a striking and almost perfect aberration of *Argynnis niobe*, captured on August 2nd of this year, at St. Moritz, Engadine. On the upper side the usual black markings are symmetrically run together and extended in area to form an irregular transverse black banding across all four wings, the submarginal orange lunules barely and most indefinitely defined, the black veining, wherever it is at all apparent, widely emphasized, and the usually wide band of orange inside the lunules only marked by small unconnected remnants. On the underside the forewings with the black spots run together to form a very irregular transverse band, no remnants of black lunules on the hind margin, no trace of silver at the apex of wing; on the underside of the lower wing the basal spots are united radially into three large silver blotches, the middle transverse row of silver spots are completely suppressed, the silver lunules of the outer margin are more or less extended basally into streaks, and only a slight indication of black scaling to the outer edge of these silver spots.

Mr. L. W. Newman exhibited a large selection of specimens bred from Irish parents, including series of *Pieris napi*, with very dark and yellow flushed examples, *P. rapæ*, *Polyommatus icarus* with brilliant blue females, *Dryas paphia*, *Melitæa aurinia*, *Hipparchia semele* with many very pale examples, etc.; four specimens of *Neuria reticulata* (*saponariæ*) bred from Cork larvæ, in which the usual dull ochreous ground colour is replaced with a lovely pink suffusion; a series of *Dianthœcia luteago* var. *barrettii*, bred from Cork and Devon larvæ and dug pupæ; a very beautiful varied series of *Pachnobia hyperborea* (*alpina*), bred from dug pupæ at Rannoch; series of *Agriades coridon* females from Herts, including the var. *semisyngrapha*, intermediates and other extreme forms; a bred series of the yellow var. *rossica* of *Callimorpha dominula* from Kent; a series of bred *Strymon pruni* from Huntingdon; wild collected cocoons with living pupæ of *Pharetra euphorbiæ* (*myricæ*) and *Dicranura bicuspis*, showing the wonderful protective resemblance to the environment; eight out of the ten specimens of *Gastropacha ilicifolia* bred from ova laid by the female captured at Cannock Chase last year, with preserved larvæ of the species; bred series of *Agrotis ashworthii*, *A. agathina*, *A. lunigera*, *Ptychopoda* (*Acidalia*) *contiguaria*, and *Boarmia repandata* from Wales; a bred series, second brood, of *Eupithecia innotata* from Durham; series of *Gnophos myrtillata* (*obfuscaria*) and *Anarta cordigera* from Braemar and Rannoch respectively; a series of *Heliothis peltigera*, showing the different facies of the spring (June), probably immigrant, specimens and those bred and captured in autumn (September); and the two remarkable examples of *Anthrocera filipendulæ* ab. *chrysanthemi*, bred at St. Anne's-on-Sea, in 1914, in which the red coloration is mostly obscured by dark brown or black suffusion.

Mr. A. H. Jones exhibited a male aberration of *Melanargia galathea* taken at Folkestone, showing decrease of black marking on the upperside, so that the central transverse white area was regular and continuous; a female example of the same species from the Splugen Pass in which the markings on the underside of the hindwings had coalesced to form a complete band; an *Agriades coridon* taken at Deal by Mr. Charles Fenn, a female of the very pale brown form known as ab. *pallida*; an ab. *pallida* of *Cœnonympha pamphilus* from Otford; and three examples from Eltham showing the recent spread of melanism, *Amphidasis betularia* var. *doubledayaria*, *Thera variata*, a modified var. *obliterata*, and *Cidaria immanata*, a dusky form.

Mr. W. Schmassmann exhibited very fine examples of the following species of *Ornithoptera*:—

Ornithoptera lydius, three male forms; *O. crœsus*, male; *O. bornemanni*, three male forms; *O. poseidon* ab. *valentina*, male; *O. poseidon*, female form *kirschi*; *O. poseidon*, female form *brunneus*; *O. paradisea*, male; and *O. paradisea*, a variety not showing the golden streak situated towards the tail of hindwing and having in consequence the green marginal area of hindwing much increased.

He also exhibited the following species of *Morpho*, *M. hecuba*, *M. justitiæ*, *M. amphitrion*, *M. cacica*, *M. rhetenor*, and *M. aureola*.

Mr. W. West (Hon. Curator) exhibited fourteen drawers of Lepidoptera from the type reference collection of the Society, which have been completely rearranged since the large additions contributed by Mr. W. G. Dawson, of Abbots Morton, Worcester.

Mr. C. P. Pickett exhibited four cabinet drawers of his interesting collection of the forms of *Angerona prunaria*, the results of seventeen years of inbreeding and of four years of experiments in exposing the larvæ to various colour environments. The results obtained under the latter conditions are somewhat remarkable as the following summary shows:

Larvæ fed up under pink muslin:—There was a tendency to reduce the size of the bands and many specimens were paler.

Larvæ fed up under red muslin:—There was a tendency to greatly increase the size of the bands and many specimens were darker.

Larvæ fed up under yellow muslin:—There was a tendency to produce a deeper yellow ground.

Larvæ fed up under green muslin:—There was a tendency to kill the yellow and orange, the former colour becoming more whitish and the latter more orange yellow.

During the seventeen years of the experiments there have been 112 broods, from 15,955 ova, producing 13,476 larvæ and 10,095 imagines.

Mr. Pickett also exhibited very long series of *Agriades coridon* taken during the last four seasons in the Herts district, and showing much extreme variation. There were included lovely specimens of the ab. *semisyngrapha*, ab. *inæqualis*, ab. *striata*, ab. *obsoleta* and the newly differentiated asymmetrical gynandromorphic females with one side smaller than the other, the smaller side always containing some amount of androconial scales. One extreme aberration was a remarkable albino male whitish over the entire uppersurface without dark margin, and another extreme aberration a male with the black margin extending uniformly and widely round the margins of the hindwings as well as of the forewings.

The Rev. F. D. Morice exhibited a collection of British Chrysididæ and a collection of the more conspicuous species of Palæarctic Chrysididæ (non-British) and stated that this group of brilliantly coloured Hymenoptera were parasitical on the wood-burrowing bees and sand wasps. It was somewhat remarkable that the British and many Palæarctic species were much more brilliantly coloured than their tropical relatives.

Mr. B. S. Curwen exhibited series of European parnassiids *Doritis apollinus*, *Parnassius apollo*, *P. delius* and *P. mnemosyne* with several aberrations; series of *Lycæna arion*, *L. arcas*, *L. euphemus*, *L. alcon* and *L. iolas* with *Polyommatus amanda*: and several aberrations of *Apatura ilia* including ab. *iliades* taken near Laon in early July of 1914.

Mr. A. W. Mera exhibited a series showing the variation obtainable in *Psilura monacha*. The series included examples ranging from typical forms to black specimens. They were bred from a typical female crossed with a black male. The strain was originally from Ringwood and North Kent and has been interbred and selected for some years.

Mr. A. E. Tonge exhibited *Agriades thetis* from Folkestone including a female with large yellow lunules on the hindwings, and from Reigate a very small male measuring only 22mm.; specimens of *Polyommatus icarus* from Deal, Reigate, etc., including strong blue females, ab. *icarinus*, ab. *striata*, etc.; two salmon pink forms and a melanic form of *Bryophila perla* from Deal; and four different forms of *Bryophila muralis* (*glandifera*) from the same locality.

Mr. Harold B. Williams exhibited ;—

Euchloë cardamines: a pair with extra spot on underside of forewings.

Cœnonympha pamphilus ab. *pallida*, Tutt., specimens from North Herts, 1914.

Aricia medon: specimens from Surrey, spring brood, including ab. *albiannulata*, Harr., and summer specimens for comparison.

Rumicia phlæas; ab. *radiata*, Tutt, and ab. *obsoleta*, Tutt, from Wimbledon, and a var. with the greater part of the left forewing white, from North Herts, 1914.

Polyommatus icarus: specimens of spring brood from Surrey, showing the strong tendency to obsolescence in spotting of underside observed in this brood, also ab. *obsoleta*, Clark, ab. *subobsoleta*, Tutt, ab. *antico-striata*, Tutt, and other forms. 1914.

Amorpha populi: two gynandromorphs, bred August, 1914.

Agriades coridon: specimens from North Herts., 1914, including ab. *semisyngrapha*, ab. *obsoleta*, etc., and a fine "khaki" coloured aberration of the female, ab. *pallida*, with a few ab. *inæqualis*, Tutt, and other interesting female forms.

Epinephele jurtina (*janira*)*:* two bleached forms.

The Rev. J. E. Tarbat exhibited two unusually large females of a very dark form of *Agrotis puta* taken at Portsdown, and a very small third brood female of *Pieris rapæ* measuring only 38mm. in expanse of wings.

Mr. G. Brooks exhibited an aberration of *Abraxas grossulariata* bred from a wild larva taken at Dunstall in 1910. The whole of the ground colour was a pale orange suffusion, and the usually bright orange band of the forewings was obsolete.

Mr. J. Platt Barrett exhibited the three European alpine species of *Parnassius* taken by him in the same neighbourhood in Switzerland, *P. apollo*, *P. delius* and *P. mnemosyne*, and remarked on the small amount of variation he had seen in this year's specimens.

Mr. F. H. Stallman exhibited a short series of *Xanthorhoë* (*Melanippe*) *fluctuata*, taken in a garden at Dulwich during 1914, varying from dark suffused to pale, and including two var. *costovata*. Also a richly coloured var. *costovata* taken at Dulwich in 1913.

Rumicia phlæas: with the red band on hindwings only represented by slight red dashes on the nervures. Oxshott, May 17th, 1914.

Noctua augur: two forms bred from wild larvæ; one June, 1914, and the other June, 1913, the latter having a very "agrotid" appearance.

Triphæna comes: a "washed-out" looking specimen bred from Wicken Fen larva 1913; and a specimen bred in 1913 from a Wimbledon larva without the black band on hindwings, but with the usual blackish suffusion at the base and apex of these wings present.

Mellinia circellaris (*ferruginea*)*:* a rich red form and a pale slatey form; also a variety with ground colour light orange and all transverse lines a dull black; the nervures towards the outer margin are also marked with black, giving the insect a streaky appearance. The black lower portion of the reniform mark is not so distinct as in the typical specimens. All from Box Hill, 1914.

Mr. Stanley Edwards exhibited two boxes of butterflies of the genus *Papilio* from the Indian and Austro-Malayan Regions including *P. hector*, *P. theseus*, *P. diphilus*, *P. antiphus*, *P. aristolochiæ*, *P. polydamon*, *P. polytes* and its allied forms, *P. nicanor*, *P. polydorus*, and *P. alphenor*.

Mr. B. S. Williams exhibited a typical male and a totally melanic female of *Biston hirtaria*, bred from dug pupæ, Finchley, 1914. Mr. Prout has identified the form as var. *fumaria*, Haw., of which only two other specimens are known, one taken in Silesia and the other is in the National Collection, the latter being brown instead of black.

Mr. W. G. Sheldon exhibited the lepidoptera taken by him during a two months' stay in Russia in the early summer of 1914, of which an account has been given in the *Entomologist*, p. 233 *et seq.* (1914).

I. Species that do not occur further west than Russia:

Scolitantides pylaon, *Glaucopsyche cœlestina*, *Satyrus anthe*, and *Hesperia tessellum*.

II. Species that are only rare in districts further west than Eastern Russia:

Colias erate, *Polyommatus eroides*, *Neptis lucilla*, *Erebia afer*, *Hesperia cribrellum*, *Cœnonympha leander*, and *Pararge clymene*.

III. Species that occur in Central Europe and which present different forms in Russia:—

Anthocharis belia, *Euchloë cardamines* var. *volgensis*, Sheld., *Zegris eupheme*, *Callophrys rubi* var. *schamyl*, Sheld., *Polyom-*

matus amanda var. *lydia*, *Melitæa aurinia* var. *sareptana*, *M. cinxia* var. *obscurior*, *M. phœbe* var. *ætheria*, *M. aurelia* var. *seminigra*, *M. didyma*, *M. trivia* var. *fascelis*, *Argynnis niobe* var. *kuhlmanni*, *Melanargia iapygia* var. *suwarovius*, and *Satyrus hermione* var. *tetrica*.

Mr. D. H. Pearson exhibited aberrant examples of Rhopalocera taken by himself this year in Switzerland and the Tyrol including—

Brenthis pales: the small mountain form and the ab. *napæa* from Pontresina, showing considerable variation towards melanism, and some specimens with purple suffusion.

Erebia medusa var. *hippomedusa:* from below Alp Grum towards Poschiavo.

Albulina pheretes: very large examples from near Bormio.

Brenthis thore: from Alvaneu Bad.

Erebia lappona: bleached specimen from Pontresina, and an aberration from Mont Cenis in which there is a continuous wide band of dark markings on the underside of the lower wings.

Erebia ceto: strongly marked form from Binn and var. *obscura*, with a specimen from Trafoi with well defined white centres to spots.

Melitæa aurelia: variegated form from Susa and another from Alvaneu Bad.

Melitæa varia: fine underside aberration.

Parnassius apollo: with extremely large red spots on the costa and disc of the hindwings. Bozen.

Mr. T. W. Hall exhibited three cabinet drawers containing his collection of *Polyommatus icarus*, *Agriades coridon*, and *A. thetis* (*bellargus*). Amongst the series of the first-named species were some brilliantly blue and large females from Sligo. In the series of *A. coridon* were examples of ab. *syngrapha* and ab. *semisyngrapha* with several gynandromorphous specimens and streaked females. The *A. thetis* included a brilliant, streaked female and many underside aberrations.

Dr. E. A. Cockayne exhibited the series of *Agriades coridon* already described in the *Ent. Record* on page 222, and stated that he had since succeeded in finding *androconia* in all the six specimens dissected. He also showed two further gynandromorphs, the species being *Polyommatus icarus*, of which the following are the descriptions and details:—

(1) Gynandromorphous *P. icarus*, Sligo, 1914.

Upperside like a male in shape and colour, but with two small orange lunules on each forewing and a row of orange lunules on each hindwing.

Micr.—Small groups of brown scales scattered all over the wing amongst the blue ones. Androconia numerous on both forewings.

Underside like a female.

Micr.—Small groups of scales of male colour scattered amongst those of female colour.

Abdomen male in appearance.

This is a symmetrical mixed gynandromorph with male element preponderating on upper-, female on underside.

(2) Gynandromorphous *P. icarus*, Clare, 1914.

General appearance female, approaching ab. *cœrulea*. Small streaks of male colour on right forewing and on both hindwings. On these areas androconia are as numerous as on areas of the same size and situation in a normal male.

Abdomen female in appearance. It contained two ovaries. External genitalia male.

In addition Dr. Cockayne gave the following descriptions and details of the gynandromorphs exhibited by Mr. T. W. Hall:—

(3) Mr. Hall's *P. icarus*. ? Gynandromorphous.

Upperside of a brilliant blue, like that of *Agriades thetis*. Streak of brown on left forewing running from base to margin, a broad band of similar colour along costa of left hindwing. Orange lunules on upperside like a normal female. No androconia could be found.

Micr.—Underside showed that a large part was covered by scales similar in structure and colour to those normally found only at base. They were distributed irregularly in long streaks on all four wings, especially on right forewing, where they extended almost to the margin. This is a similar condition to that present in the *A. coridon* exhibited by Mr. H. B. Williams.

(4) Mr. Hall's Royston *A. coridon* (gynandro.).

This looks like a normal female, but there is slight blunting of the apex of the right forewing. Near the apex are about 50 blue scales, and amongst them are eight androconia. It is therefore a predominantly female gynandromorph.

In conclusion Dr. Cockayne remarked that there was evidently a race of *A. coridon* producing gynandromorphs of predominantly female type at Royston, and that the descent was probably direct. The evidence in favour of this view is that the genital organs in the majority of cases are those of normal females. It has been previously shown that there is evidence of direct descent of predominantly male type of gynandromorphism by Schultz who bred 4 *Lymantria dispar*, which were male in all respects except for splashes of female colour on the wings, from 85 pupæ. One of these males was paired with a normal female, and out of 65 pupæ of the brood, 2 similar gynandromorphs were bred.

Mr. H. E. Page exhibited a series of local races of *Plebeius argus* (*agon*) from Abriès in the French Alps, Sion and Berisal in the Swiss Alps, and from Pajares and Brañuelas in Spain. The last were of the remarkable form named by Dr. Chapman var. *casaiacus*, and were taken by Mr. and Mrs. Page in August, 1914.

DECEMBER 10*th*, 1914.

MR. A. E. GIBBS, F.L.S., F.E.S., *Vice-President*, in the chair.

Mr. W. Schmassmann, F.E.S., was elected a member.

Mr. W. J. Lucas read a paper on the "British Longhorned Grasshoppers," and illustrated his remarks with a series of lantern slides of all the native species. (See page 49.)

Mr. W. J. Kaye exhibited a plant of *Orobanche minor*, the lesser broomrape, that had come up in a pot of *Salvia* which was being grown in a glasshouse at a temperature of 65°. The plant was a little drawn, but was otherwise vigorous and healthy. The soil had been taken from the garden, and it was somewhat of a mystery where the plant came from. It was known to be parasitic on a number of plants, including ivy.

A further exhibit was a beautiful hybrid *Cattleya*—*C. nafala-alba*, the result of crossing *C. aurea* with *C. triana-alba*. The lip of the flower retains the *aurea* coloration, but reduced in intensity, while the sepals and petals take the pure white of the *trianæ-alba*.

Mr. H. Moore exhibited a drawer of Decticinidæ containing *Decticus albifrons*, Fab., the largest European species, from Spain, where at times it is very destructive; *D. intermedius*, Fab., and *D. tessellatus*, Fab., also from Spain, the former being very common near Cadiz; *D. verrucivorus*, Linn., chiefly from Savoy. In the pasture above the Monastery of La Grande Chartreuse any number might have been taken. Also *Platycleis grisea*, Fab., from the South Coast of England and a number of French localities.

Mr. Step exhibited the fungus *Tremella mesenterica*, growing on dead branches, from Ashtead Woods. It is interesting as being one of the lowest forms of the Hymenomycetes, the order which includes the mushrooms and toadstools. In the Tremellinæ no portion of the plant is specialized for spore-production, the entire surface producing spores mounted upon basidia in twos and fours. A very small percentage of the bulk consists of solid matter, the remainder is water, and in dry atmospheric conditions the plant shrivels into a mere film of horny gelatine, which revives, however, with the recurrence of dampness.

He also showed an apterous form of long-horned grasshopper from South Africa—*Hetrodes petersi*, female. Both sexes, he believed, were apterous, and it was remarkable that in this condition the "ears" in the tibiæ of the forelegs are retained.

Mr. A. E. Gibbs exhibited the two largest species of sawfly (*Sirex*) inhabiting the British Isles, and read the following notes on them and the parasite *Rhyssa persuasoria* :—

"THE GIANT SAW-FLY AND ITS PARASITE.—About two years ago I drew the attention of members of the Society to the infestations of two of our British species of giant saw-flies which occurred at St. Albans in 1903. In that year a large number of specimens of *Sirex noctilio*, Fabr., appeared in the St. Albans Technical School, and were ascertained to be emerging from a trunk of silver fir which had been bought from a local dealer and was being cut up into planks for the use of students in the wood-working classes. The tree was extensively tunnelled by the larvæ, and the instructor very kindly put the wood aside for observation. Numerous imagines appeared, and we used to catch them on the windows in the morning when they were trying to escape. Strangely enough, my attention was called at the same time by the late Mr. F. G. Kitton to the appearance in his wood-cellar of numerous specimens of the other large species—*Sirex gigas*, Linn. These were emerging from the trunk of a fir tree which had grown on his lawn and had been felled and cut up for firewood. I subsequently made up a museum case with specimens obtained from these sources, showing the life history of at least one of the species—*S. noctilio*. The blocks of wood show very well the way in which the larvæ bore their tunnels in the solid timber, pupating in them, and eventually making their way out as perfect insects. To-night I have to show you a creature which is a parasite on the giant saw-fly, and which may therefore be regarded as a useful insect. It is called *Rhyssa persuasoria*, Linn., and the specimen I exhibit was sent to me by Mr. Charles Oldham, having been taken in Berkhamsted, in July, by Mr. Edward Popple.

Like its host, this insect belongs to the great order Hymenoptera, but they are members of entirely different groups, for the *Rhyssa* is an ichneumon. The saw-flies are phytophagous or plant-feeding creatures, while the ichneumons are entomophagous—that is, their larvæ are parasitic on other insects, and do not burrow into the trunks or defoliate the plants as do the caterpillars of the saw-flies. Both these creatures have, however, one feature in common, and that is that their females possess well-developed processes on the terminal segment of the abdomen. These are their ovipositors, and in the case of *Rhyssa* especially the ovipositor is immensely long compared with the size of the insect. The necessity for this great length is explained by the fact that the larvæ on which it feeds are wood-borers and make their way deeply into the trunk in which they live. The female *Rhyssa* has the wonderful power of detecting the presence of the unseen *Sirex* grub and of exactly locating it, and more wonderful still, it is able to pierce the hard wood with its slender and fragile-looking ovipositor and to deposit its egg in the body of the grub. Instances have been known where the fly has driven its ovipositor so far into the wood that it has been unable to withdraw it, and it has perished in that position. I do not think that *Rhyssa persuasoria* is a common insect in England. No doubt it occurs in great numbers in those parts of our island where the fir trees in which the *Sirex* burrows are more abundant. I have been unable to ascertain whether *Rhyssa persuasoria* ever attacks the larvæ of *Sirex noctilio* or whether it confines its attention to the allied species."

JANUARY 14*th*, 1915.

Dr. Chapman exhibited an *Anthrocera exulans* with six wings, and one of *A. anthyllidis* with three tarsi on the left mesothoracic leg; also one of *A. achilleæ* with symmetrical wing notches (see *Proc. Ent. Soc.*, 1914, p. lxxxiv.).

He also showed, three exotic lattice-work or lace cocoons, probably of saturniids or lithosiids, and the pupation burrows of *Scardia boleti* (from Gomshall), showing the trap-door closing the cocoon at the bottom of an outer tube (closed externally) of some length, sometimes twice as long as the cocoon-tube.

Mr. H. Moore exhibited cases of Psychidæ from the Island of Rhodes, the Indian Territory of the U.S.A., and the Upper Amazon. *Œceticus kirbii*, Guild., from Antigua, W.I., with male and female pupæ; also cocoons of *Caligula simla*, West., N. W. Himalaya, *Attacus hesperus*, Demarara, *Samia cecropia*, Lin., N. America, and *Aglia tau*, Europe.

Mr. R. Adkin read a paper entitled "Some Pupal Habitations" (see page 59), and exhibited a large number of specimens in illustration.

Mr. Sich read the following account of a Field Meeting held in the early part of the 17th century, taken from the "Flora of Middlesex" by H. Trimen and W. T. Dyer, published in London in 1869.

The authors say, "It is to Thomas Johnson, however, that we are especially indebted for advancing the local botany of our country at this period." His first printed book was entitled "Iter Plantarum Investigationis ergo susceptum a decem sociis in Agram Cantianum Anno Dom. 1629, Julii 13," a pleasantly written account of one of the herborising excursions which for some years the company had been in the habit of making.

This is the first printed account of a botanical excursion in England.

An Appendix of three pages to this little book is of special interest:—

"Ericetum Hamstedianum seu Plantarum ibi crescentum observatio habita Anno eodem 1 Augusti."

This is an account of a similar excursion to Hampstead Heath on August 1st, 1629. The party consisted of Johnson and nine others. They left London early in the morning and proceeded to Kentish Town, then a country place enough, whence they walked to Highgate, where they were caught in a heavy shower; but nothing daunted, made their way into the wood (probably Bishop's and Ken Woods) and then on the heath. They returned to London by way of Hampstead Village and Kentish Town. Three lists of plants observed are given, the names used being those of Lobel, Dodoens, and Gerarde, and the very common species being omitted. There is also a short list of some others which Johnson had seen on the same ground on May 1st of the same year. The whole number of flowering plants observed was 72.

This reads almost like an account of one of our own excursions, though it took place nearly 286 years ago.

JANUARY 25th, 1915.

ANNUAL MEETING.

The first meeting, held at seven o'clock, was devoted to the business of the Society.

The Balance Sheet was read by Mr. Russell, one of the Auditors, and was adopted by the meeting (see pages xvi.-xvii.).

The Report of the Council (see page xi.), was read and adopted by the meeting.

It was announced that the Officers for the ensuing year had been elected as follows :—

President.—B. H. Smith, B.A., F.E.S.

Vice-Presidents.—A. E. Gibbs, F.L.S., F.Z.S., F.E.S., and A. E. Tonge, F.E.S.

Hon. Treasurer.—T. W. Hall, F.E.S.

Hon. Librarian.—A. W. Dods.

Hon. Curator—W. West (Greenwich).

Hon. Editor.—E. Step, F.L.S.

Hon. Secretaries.—Stanley Edwards, F.L.S., F.Z.S., F.E.S., and H. J. Turner, F.E.S.

Council.—R. Adkin, F.E.S., S. R. Ashby, F.E.S., J. Platt Barrett, F.E.S., Dr. T. A. Chapman, F.Z.S., F.E.S., B. S. Curwen, W. J. Kaye, F.E.S., D. R. Morford, N. D. Riley, F.E.S., and W. G. Sheldon, F.E.S.

The President then read the Annual Address (see page 70).

Votes of Thanks were passed to the President, Treasurer, Officers, Council and Auditors for their work during the year.

ORDINARY MEETING.

Mr. A. W. Buckstone exhibited a long series of *Bupalus piniaria*, bred from full-fed larvæ taken at Oxshott, Surrey, which showed considerable variation. The usual pale markings of the males varied from white through various shades of yellow to pale brown. In one or two specimens there was little of this to be seen, owing to the encroachment of the black border. The females varied in colour from a dirty yellow, through various shades of brown, to a very dark grey. In the last mentioned specimens the usual markings were scarcely perceptible. He also showed specimens of *Hipocrita jacobææ*, bred from full-fed larvæ taken at Oxshott. One specimen was very pale, one with smoky underwings slightly streaked with pink, and a third with underwings entirely smoke coloured. All three specimens were semitransparent. Some examples of *Spilosoma menthastri* which on emergence were suffused with a pink colour. This entirely faded away after a few months. The fact that the pot which contained the pupæ was covered with a wet cloth may have had something to do with this pink coloration. He believed that a similar thing had been observed with regard to the "emeralds"; and a considerable number of species are suffused with green on emerging in wet weather—this colour fading away in a few hours.

Mr. Sich exhibited a female of the common wasp which was hibernating hanging by its jaws to the lid of the box, its wings being folded longitudinally.

Mr Edwards exhibited living specimens of *Ephestia kühniella*, pupæ and cocoons. They were obtained from oatmeal.

Mr. G. T. Porritt exhibited a very fine series of the vars. *nigrocostata* and *nigrosparsata* of *Abraxas grossulariata*, bred by himself from wild Huddersfield larvæ last season.

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NOTE:—*Diestrammena marmorata*, Dr. Burr, in an article in the "Ent. Record" for June, 1914, points out that his previous determination of this species ("Ent. Rec.," xxv., 228, 1913) was incorrect. His attention was called to this by Chopard ("Bull. Soc. ent. Fr.," 1913, p. 284. 1914, p. 122), who considered it to be the closely allied and recently diagnosed species *Tachycines asynamorus*, Adelung ("Ann. Mus. Zool. Ac. Imp. Sci.," St. Petersburg, 1902, p. 56). This determination, after careful comparison, Dr. Burr confirms ("Ent. Record," xxvi., p. 140).—H. J. TURNER.

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